Series 11 and 12 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a hand or cam-operated poppet valve designed for inline mounting, and built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. Please take a few minutes to look over the accompanying information, and save it for future reference.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Cam Valves: To operate properly and avoid damage to the valve, cam operators must be moved by the operating cam only within the following limits:

Plunger:	0.07 to 0.25 inch
Roller:	0.10 to 0.29 inch
One-way roller:	0.05 to 0.10 inch

Air Lines: Before installing the valve in your system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the circuit.

Valve Inlet (Port 1): Be sure the inlet line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends or a clogged filter element.

Valve Outlet (Port 2): For best response and control of the mechanism being operated by the valve, locate the valve as close as possible to this mechanism. The lines must be of adequate size and free of crimps and sharp bends.

Valve Exhaust (Port 3): Exhaust of 3-way valves is unported.

Operating Pressures and Temperatures: Allowable ranges are shown under *STANDARD SPECIFICATIONS* on the reverse side. Exceeding these values can shorten valve life.

Pipe Installation: To install pipe or fittings in the valve ports, engage the pipe or fitting one turn, apply thread sealant (tape *not* recommended), and tighten pipe or fitting. This procedure will prevent sealant from entering and contaminating the valve.

VALVE DESCRIPTION

Series 11 Valves

Roller

1-Way Roller

Port size: 1/4.

Operators: toggle lever, pushbutton, plunger, roller, one-way roller.

2-way or 3-way normally closed design.

Dual mounting flanges.

Toggle Lever

Pushbutton

Plunger

Series 12 Valves

Pushbutton 2- or 3-Way

Port size: 1/4 (for 2 or 3-way pushbutton), 1/8 -1/4 for Telegraph lever and 3-way Pushbutton (bottom left only).

Operators: Large pushbutton, telegraph lever.

2-way or 3-way normally closed design.

Pushbutton 3-Way Only

Telegraph Lever 3-Way Only

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VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located in the circuit is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that this valve itself does not require air line lubrication, but some optional adaptors do, i.e. air index, etc.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance. A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as Mobilgrease 28.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation.

Service kits for these valves are listed on page 3.

VALVE SPECIFICATIONS

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 5 to 150 psig (0.3 to 10 bar).
Models beginning with the numbers 1223 are limited to 125 psig (8.5 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

VALVE SERVICE

Parts for servicing your valve can be obtained from ROSS. Call ROSS Technical Services for assistance (see note below for phone number.).

Valve Body Service Kits. The service kits listed at right contain all the internal parts needed to recondition your Series 11 valve. Included are poppets, springs and retainers, stem assemblies, seals and instructions for use. Kits are not available for Series 12 valves.

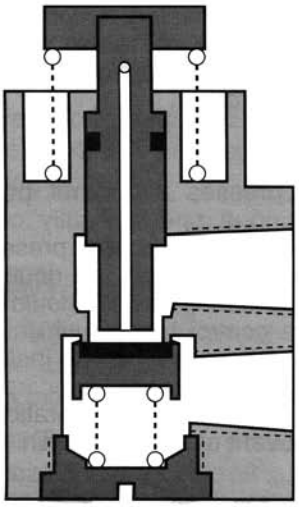
If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

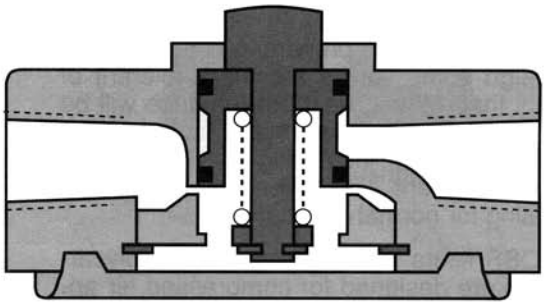
SERVICE KITS FOR SERIES 11 VALVES

Valve Model Number	Valve Body Service Kit
1121A2001	681K87
1121A2002	681K87
1123A2001	682K87
1123A2002	682K87
1131A2001	681K87
1131A2002	681K87
1131A2003	681K87
1133A2001	682K87
1133A2002	682K87
1133A2003	682K87

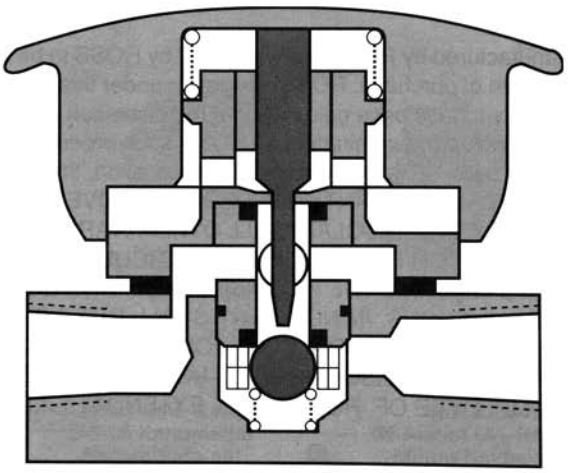
VALVE BODY CROSS SECTIONS



Series 11 Valve Body. 3/2 design shown.



Series 12 Valve Body used with pushbutton and telegraph lever operators. 3/2 design shown. Model numbers ending in 5, 6, 7, or 8.



Series 12 Valve Body with pushbutton operator. 3/2 design shown. Model numbers ending in 1 or 3.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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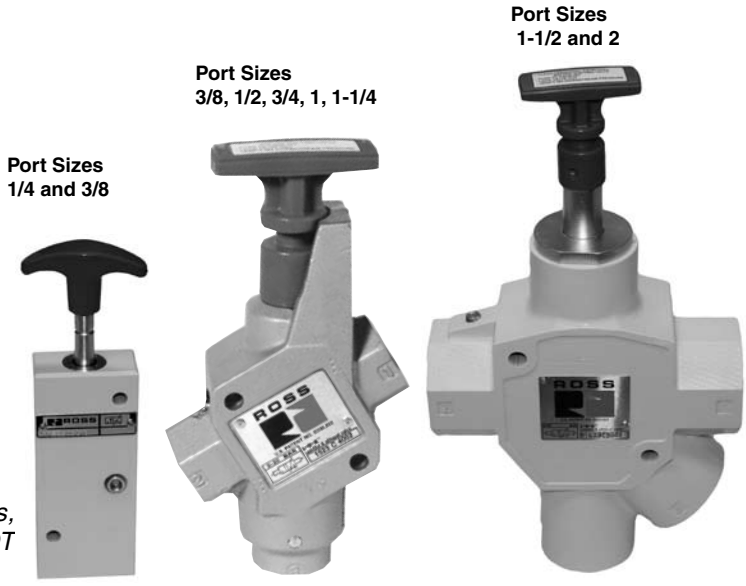
Form SS105

Series 15 Manual L-O-X® Valves (w/ Red handle) *and* L-O-X® with EEZ-ON® Operation Valves (w/ Blue handle)

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a high quality energy isolation valve for international standards compliance designed for in-line mounting. With care in its installation and maintenance you can expect it to have a long and economical service life.

Before you install this valve read the information in this folder completely, and save it for future reference.

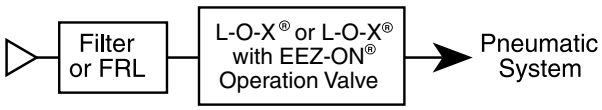


VALVE INSTALLATION

IMPORTANT NOTE: *Per specifications and regulations, these valves are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.*

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

A L-O-X® or L-O-X® with EEZ-ON® operation valve can be installed in the main or a branch line of an air system.



NOTE: The L-O-X® and the L-O-X® with EEZ-ON® operation valves are similar in appearance, but different in that the L-O-X® valve has a red handle, and the L-O-X® with EEZ-ON® operation valve has a blue handle. The operating functions of the two types of valve differ in the following ways:

L-O-X® Valve: Pushing the *RED* handle inward cuts off the supply of air to downstream components, and at the same time exhausts the air in the downstream lines to the next obstruction. The L-O-X® valve is *NOT* an emergency stop device, but simply an energy isolation device. When the red operating handle is pulled outward, supply air is again allowed to flow into the downstream lines.

L-O-X® with EEZ-ON® Operation Valve: When its *BLUE* operating handle is pushed inward this valve functions like the L-O-X® valve described above. In addition, when the blue handle is pulled outward, the flow of air to the downstream lines is gradual. When outlet pressure reaches approximately 25 psi less than inlet pressure, the valve will then open fully until the upstream pressure is exhausted or the handle is pushed down.

Air Lines: Before installing this valve in a new or existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply.

Valve Outlet (Port 2): For quick pressurizing and exhausting of downstream components, the downstream lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict the air flow from the exhaust port as this can adversely affect the speed with which downstream lines and components can be exhausted. To reduce exhaust noise, an efficient silencer may be used. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

L-O-X Sensing Port: A 1/8 NPT sensing port allows installation of either the Pop-Up Indicator (model number 988A30) or Pressure Switch option (model number 586A86) to verify pressure is released.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding these values can shorten valve life.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

EEZ-ON® Adjustment: If using a L-O-X® with EEZ-ON® operation valve with a blue handle, push the handle fully inward before applying line pressure to the inlet port. Turn the brass adjusting screw in the top of the blue handle clockwise until resistance is felt. *DO NOT TIGHTEN OR THE SCREW MAY BE DAMAGED.* Now turn the adjusting screw counterclockwise 1/2 turn. This will serve as a preliminary setting for the rate of pressure buildup. Further adjustment can then be made to suit the needs of your application.

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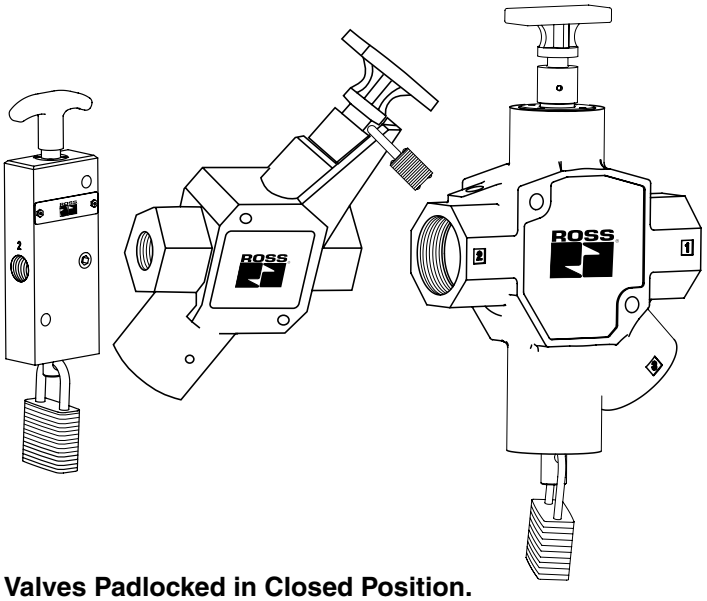
VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

IMPORTANT NOTE: To service downstream equipment, the handle of the L-O-X® or L-O-X® with EEZ-ON® operation valve must be pushed inward to cut off the air supply. The valve should then be padlocked in this position to ensure that supply air is not inadvertently turned on.



Valves Padlocked in Closed Position.
Follow correct lockout procedure as prescribed by industry or your company's lockout/tagout standards.

Observe the following general guidelines for the care and maintenance of the L-O-X® or L-O-X® with EEZ-ON® operation valve.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32
	Amoco Spindle Oil C
	Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22
	Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11
	Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve/Replace Worn Components. ROSS does not recommend disassembling the Series 15 valves for cleaning or repair.

VALVE SPECIFICATIONS

Temperature Range: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air; 5 micron recomended.
Inlet Pressure:
L-O-X®: 15 to 300 psig (1 to 20 bar).
L-O-X® with EEZ-ON® operation: 30 to 150 psig (2 to 10 bar).

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

Referenced Standards:

All standards are subject to revision. Parties are encouraged to investigate and apply the most recent editions of the standards indicated below.
OSHA 29 CFR 1910.147.
CSA Z142-02.
CSA Z460-05.
ISO 13849-1
ISO 14118:2000.
EN 1037
ANSI/ASSE Z244.1-2003.
ANSI/PMMI B155.1 - 2006.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

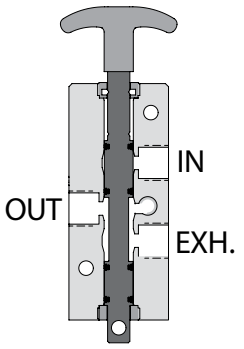
VALVE OPERATION

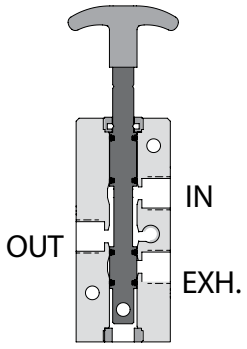
L-O-X® Valve (*RED* Handle)

VALVE CLOSED
With a short inward push of the red handle, the flow of supply air is blocked from the outlet port. Downstream air flows from outlet to exhaust port. The valve must be padlocked while in this position during maintenance to prevent it from being inadvertently pulled outward and creating the potential for injury to people or machinery.

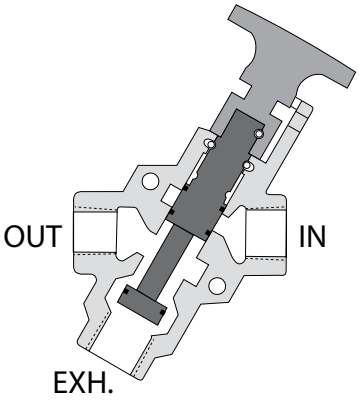
VALVE OPEN
When the red handle is pulled out, supply air flows freely from inlet to outlet, and flow to the exhaust port is blocked. A detent keeps the handle in the open position. The handle is not designed to be locked in the open position so that the valve is always ready for shutoff.

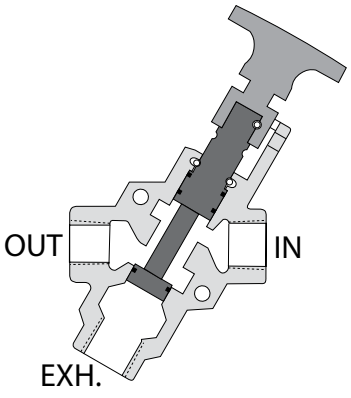
Port Sizes 1/4 and 3/8



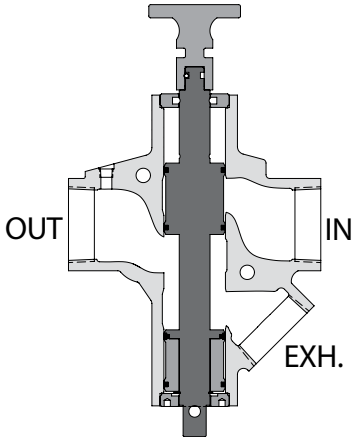


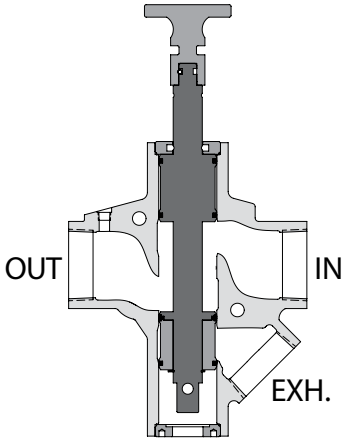
Port Sizes 3/8, 1/2, 3/4, 1, 1¼





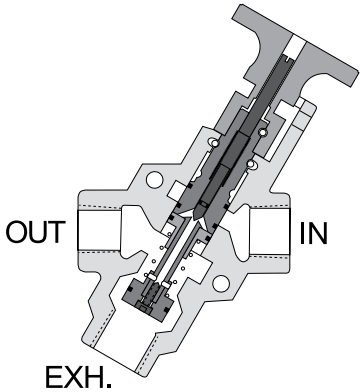
Port Sizes 1½ and 2

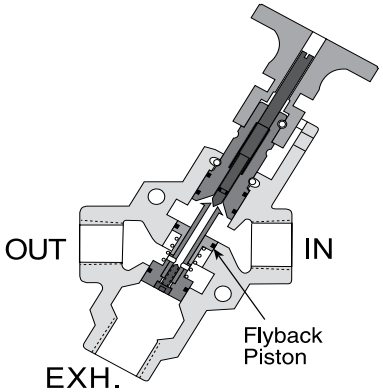


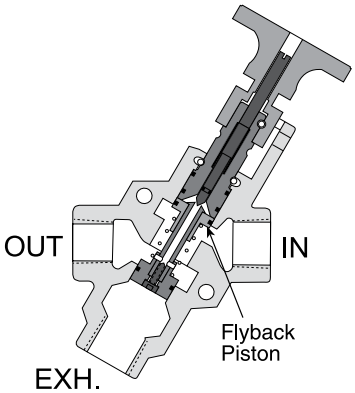


L-O-X® with EEZ-ON® Operation Valve (*BLUE* Handle)

Port Sizes 3/8, 1/2, 3/4, 1, 1¼







VALVE CLOSED
With a short, inward push of the blue handle, the flow of supply air is blocked from the outlet port. Downstream air flows from the outlet port to the exhaust port at the bottom of the valve. The valve must be padlocked while in this position during maintenance to prevent it from being inadvertently pulled outward and creating the potential for injury to people or machinery.

EEZ-ON® FUNCTION
When the blue handle is pulled outward, inlet air passes through the metered orifice (size set by adjusting screw in the handle) and begins to pressurize the outlet. High pressure air on the top of the flyback piston prevents the spring behind it from sliding the piston along the spool. The position of the piston keeps the outlet blocked from the full flow of inlet air.

VALVE OPEN
Air through the metering orifice gradually increases the pressure on the spring side of the flyback piston. At about 25 psi less than inlet pressure, the force on the flyback piston is enough to move it up the main spool. Full-pressure inlet air then flows freely to the outlet.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS123

Series 21 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a poppet valve with metal internals designed for inline mounting, and has been built to the highest standards.

With care in its installation and maintenance, you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains. A general service manual with more detailed information is available from ROSS upon request.

Double Solenoid Pilot Valve

Single Solenoid Pilot Valve

Remote Pressure Controlled Valve

VALVE INSTALLATION

Important Note:

ROSS Series 21 valves are ***not*** *designed as control valves for air clutch/brake mechanisms on mechanical power presses, and must not be installed for such use. Only double valves conforming to OSHA standards should be used in such applications.*

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

High- and Low-Temperature Valves: Temperature specifications are given on page 2. Valves (non-special) whose model numbers end with a 001, 011, 051, or 061 are **Type H** valves designed for **high**-temperature service. Valves (non-special) whose model numbers end with a 002, 003, 012, 013, 052, 053, 062, or 063 are **Type O** valves designed for **low**-temperature service.

Special Valves: If the second digit after the center letter in your valve's model number is an 8 or 9, then your valve has special features, (e.g. D2173B3952). You may consult ROSS Technical Services to verify the special features or to obtain high-pressure and vacuum service kits.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element.

Valve Outlets (Ports 2 and 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Port 3): Do not restrict the air flow from the exhaust port of the valve body or pilot body as this can adversely affect the operation of the valve. However, to reduce exhaust noise, an efficient silencer may be used. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the pilot housing. The electrical supply must correspond to these ratings. Otherwise the solenoids are subject to early failure. The power supply must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:

Pressure Control: Connect a 1/4-inch control line to the threaded port in the air head at the top of the valve. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for the pilot valve is supplied internally for most valves and requires no special connection. However, if your valve is designated for external pilot supply, a 1/8-inch pilot supply line must be connected to port X-1 in the pilot housing. See *Valve specifications* on page 2 for pressure requirements.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
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ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate (note that this valve itself does not require air line lubrication, but some optional adaptors do, i.e. air index, etc.).

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation.
Service kits for these valves are listed on page 3.

VALVE SPECIFICATIONS

NOTE: Type H valves are for high-temperature service.
Type O valves are for low-temperature service.

Pressure Controlled

Temperature Range: *For temperatures below 40°F (4°C) air must be free of water vapor to prevent formation of ice.*
Type H: 0° to 300°F (-17° to 150°C).
Type O: -40° to 175°F (-40° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure:
1/4 to 1-1/2 Port Sizes: 15 to 150 psig (1 to 10 bar).
1-1/2 to 2-1/2 Port Sizes: 30 to 150 psig (2 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure. For vacuum service models requiring external pilot supply, a pilot pressure of at least 30 psig is required.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoids: Rated for continuous duty. Voltage and hertz ratings shown on pilot housing.

Power Consumption:
Single Solenoid: 87 VA inrush, 30 VA holding on AC; 14 watts on DC.
Double Solenoid: Each solenoid, 190 VA inrush, 40 VA holding on AC; 20 watts on DC.

Ambient Temperature:
Type H: 0° to 250°F (-17° to 122°C).
Type O: -40° to 120°F (-40° to 50°C).

Media Temperature:
Type H: 0° to 300°F (-17° to 150°C).
Type O: -40° to 175°F (-40° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure:
1/4 to 1-1/2 Port Sizes: 15 to 150 psig (1 to 10 bar).
1-1/2 to 2-1/2 Port Sizes: 30 to 150 psig (2 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure. For vacuum service models requiring external pilot supply, a pilot pressure of at least 30 psig is required.

CONVERSION TO EXTERNAL PILOT SUPPLY:

When a valve is converted to external pilot supply, consult ROSS for the converted valve's model number. This will allow records and drawings to be changed and prevent errors when ordering future replacements.

INLINE POPPET VALVES: See Figure 1.

1. Remove pilot section and adaptor plate from valve body.
2. Remove pipe plug from external pilot supply port, and reinstall the plug in the internal pilot supply passage.
3. Replace pilot section.
4. Attach 1/8" pilot supply line to external plot supply port (X-1).
5. External pilot supply pressure must be at least equal to the main supply pressure.

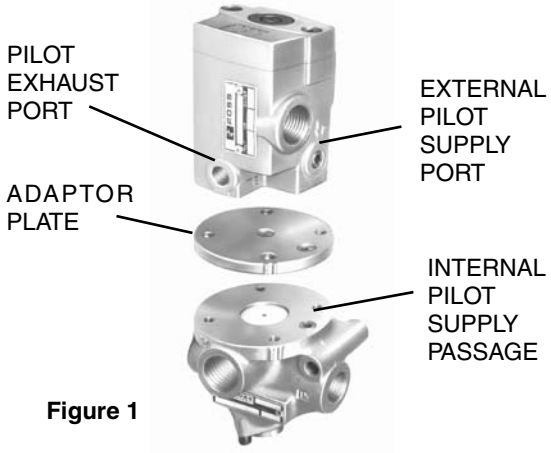


Figure 1

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindle, all required gaskets and seals, and instructions for use.

Gasket and Seal Kits. These kits are needed when valve bodies are disassembled for cleaning. They include all the necessary gaskets, O-rings, and other seals.

Solenoid Pilot Kits. These kits contain all parts needed to recondition the pilot valve. Order by the following kit numbers:

For single solenoid pilots:	Type H	**947K87**
	Type O	**946K87**
For double solenoid pilots:	Type O	**273K87**

Solenoids. Replacement solenoids can be ordered by the part numbers listed below. Specify the required voltage and hertz when ordering.

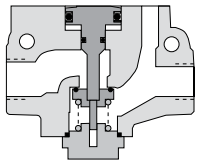
For single solenoid pilots:	Type H	**257B04**
	Type O	**411B04**
For double solenoid pilots:	Type O	**171C95**

Adapters. Some valves have adapters (e.g., time delay, PB, air index, or L-O-X® adapters) above the valve body. For information on servicing these adapters, please consult ROSS.

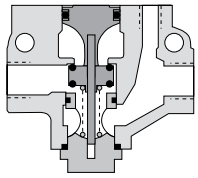
If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

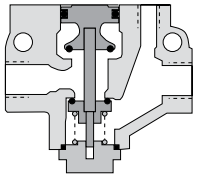
SERIES 21 VALVE BODIES



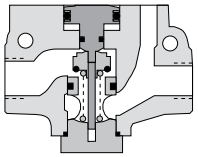
2/2 Normally Closed



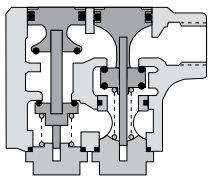
3/2 Normally Open



3/2 Normally Closed



2/2 Normally Open



4/2

VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center (1-800-GET-ROSS). However, if you choose to service this valve yourself, it is strongly recommended that you obtain a free service manual from ROSS in the U.S.A. at 1-800-GET-ROSS.

Valve Type	Port Size	Service Type	Valve Body Kit*	Gasket & Seal Kit*
2/2 Normally Closed	1/4, 3/8, 1/2	H	207K77	198K77
		O	237K77	228K77
	1/2, 2/4, 1	H	208K77	199K77
		O	238K77	229K77
	1, 1¼, 1½	H	209K77	200K77
		O	239K77	230K77
2/2 Normally Open	1/4, 3/8, 1/2	H	213K77	198K77
		O	243K77	228K77
	1/2, 2/4, 1	H	214K77	199K77
		O	244K77	229K77
	1, 1¼, 1½	H	215K77	200K77
		O	245K77	230K77
3/2 Normally Closed	1/4, 3/8, 1/2	H	219K77	201K77
		O	249K77	231K77
	1/2, 2/4, 1	H	220K77	202K77
		O	250K77	232K77
	1, 1¼, 1½	H	221K77	203K77
		O	251K77	233K77
3/2 Normally Open	1/4, 3/8, 1/2	H	225K77	201K77
		O	255K77	231K77
	1/2, 2/4, 1	H	226K77	202K77
		O	256K77	232K77
	1, 1¼, 1½	H	227K77	203K77
		O	257K77	233K77
4/2	1/4, 3/8, 1/2	H	260K77	258K77
		O	264K77	262K77
	1/2, 2/4, 1	H	261K77	259K77
		O	265K77	263K77
	1, 1¼, 1½	H	278K77	277K77
		O	289K77	288K77

*Consult ROSS Technical Services for high-pressure and vacuum service kits.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

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3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

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5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS such product is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS099

Series 27 Pilot Operated Checks

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a pilot operated check valve with poppet internals, and has been built to the highest standards.

With care in its installation and maintenance, you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.

Single PO Check

Dual PO Check with Blow-Down and Solenoid Pilot

Dual PO Check with Blow-Down

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet(s) (V1, V2, or VLV): Inlet ports (some valves have two inlets) should be connected to the outlet(s) of the directional valve (typically ports 2 and/or 4). Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element.

Valve Outlet(s) (C1, C2, or CYL): Outlet ports (some valves have two outlets) should be connected to cylinder port(s). For faster pressurizing and exhausting of the cylinder being operated by the valve, locate the check valve as close as possible to the cylinder. The connecting lines must be of adequate size and be free of crimps and sharp bends (unrestrictive).

Valve Exhausts and Vents: Do not restrict the air flow from the exhaust or vent ports of the valve body or pilot body as this can adversely affect the operation of the valve.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the pilot housing. The electrical supply must correspond to these ratings. Failure to use an electrical supply of the correct voltage and amperage may result in incorrect operation of the valve. See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Remote Trapped Pressure Relief: Pilot operated check valves designated for remote trapped pressure relief function (blowdown) require a 1/8-inch supply line to be connected to port P (or port BP where provided). As long as pressure is available at port P (or port BP), the check valve operates normally. Loss of pressure at port P (or port BP) will cause the check valve to relieve trapped pressure. Also, see Pilot Supply below for Solenoid Control.

Pilot Supply:

Pressure Control: Connect a 1/8-inch (1/4-inch on Type B valves) control line to the threaded port in the air cap (labeled VP on some models) at the top of the valve. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for the pilot valve is supplied externally and requires a 1/8-inch pilot supply line connected to port P in the valve. See *Valve specifications* on page 2 for pressure requirements. Loss of pressure to port P during operation will cause the check valve to relieve trapped pressure.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

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ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that this valve itself does not require air line lubrication, but some optional adaptors do, i.e. air index, etc.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.
A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037) before beginning any disassembly operation. Service kits for these valves are listed on page 3.

VALVE SPECIFICATIONS

Pressure Controlled Pilot Operated Check Valves *WITHOUT* Trapped Pressure Relief Function

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 15 to 150 psig (1 to 10 bar).

Signal Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot Operated Check Valves *WITH* Trapped Pressure Relief Function

Solenoids: Rated for continuous duty. Voltage and Hertz ratings shown on pilot housing.

Power Consumption: 8 VA inrush, 6 VA holding on AC; On DC, 4.5 watts with 4-pin Micro connector, 6 watts with 3-pin Mini connector.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

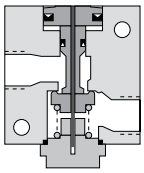
For Internal Pilot Models, Ambient/Media range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

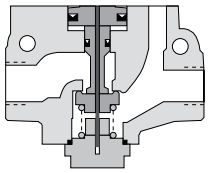
Inlet Pressure: 30 to 150 psig (2 to 10 bar).

Signal Pressure: Must be equal to or greater than inlet pressure.

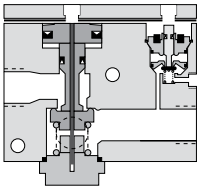
SERIES 27 PO CHECK VALVE BODIES



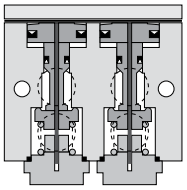
Type A Single



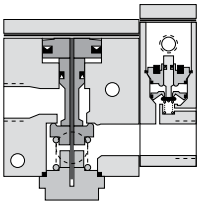
Type B Single



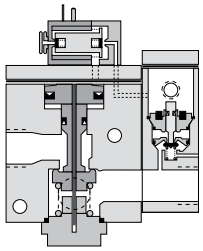
Type F Single with Remote Blow-Down



Type C Dual without Blow-Down



Type D Dual with Blow-Down (Remote Blow-down model shown)



Type E Dual with Solenoid & Blow-Down (DIN connector model shown)

VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center (1-800-438-7677 inside the U.S. or 706-356-3708 outside the U.S.). However, if you choose to service this valve yourself, it is strongly recommended that you obtain a free service manual from your local ROSS distributor. Distributor information as well as downloadable service manuals are available at www.rosscontrols.com.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindle, all required gaskets and seals, and instructions for use.

Blow-Down Service Kits. These kits contain all parts needed for complete reconditioning of a blow-down adaptor. Included are inserts, all required gaskets and seals, and instructions for use.

Replacement Solenoid Pilot Assemblies. These kits contain replacement solenoid assemblies. See the chart below.

Solenoid Coils. Replacement solenoid coils can be ordered by the part numbers listed in the chart below.

Valve Model	Solenoid Assembly	Coil Only
2778C3900	851C79*	306K33*
2778C3901	976C79*	316K33*
2778C3902	976C7916	316K3316
2778C3904	1086C7916	322K3316
2778C4900	851C79*	306K33*
2778C4901	976C79*	316K33*
2778C4902	976C7916	316K3316
2778C4904	1086C7916	322K3316
2778C5900	851C79*	306K33*
2778C5901	976C79*	316K33*
2778C5902	976C7916	316K3316
2778C5904	1086C7916	322K3316
2778A6900	851C79*	306K33*
2778A6901	976C79*	316K33*
2778A6902	976C7916	316K3316
2778A6904	1086C7916	322K3316

* Specify the required voltage and hertz when ordering.

If you need additional information, or have any questions about installing or servicing your valve, call ROSS *Technical Services* in the U.S.A. at:
1-888-TEK-ROSS(835-7677) or 1-706-356-3708.

Valve Model	Port Size	Valve Type	Valve Body Kit Number	Blow-Down Kit Number
2751A2903	1/4	B	1671K77	–
2751A2908	1/4	A	1267K77	–
2751A3901	3/8	B	1671K77	–
2751A3908	3/8	A	1267K77	–
2751A3922	3/8	F	1952H77	–
D2751A3922	G 3/8	F	1952H77	–
2751A4902	1/2	B	1671K77	–
2751A4905	1/2	B	1679K77	–
2751A4915	1/2	A	1267K77	–
2751A4922	1/2	F	1952H77	–
D2751A4922	G 1/2	F	1952H77	–
2751A5903	3/4	B	1679K77	–
2751A5917	3/4	F	1953H77	–
2751A6901	1	B	1679K77	–
2751B6904	1	B	1678K77	–
2751B7901	1¼	B	1678K77	–
2751B8902	1½	B	1678K77	–
2768C3900	3/8	C	1263K77	–
2768C3901	3/8	D	1263K77	404H77
2768C3904	3/8	D	1263K77	1704H77
2768C4900	1/2	C	1535H77	–
2768C4901	1/2	D	1535H77	404H77
2768C4904	1/2	D	1535H77	1704H77
2768C5900	3/4	C	1264K77	–
2768C5901	3/4	D	1264K77	404H77
2768C5904	3/4	D	1264K77	1704H77
2768A6900	1	C	1264K77	–
2768A6901	1	D	1264K77	404H77
2768A6904	1	D	1264K77	1704H77
2778C3900	3/8	E	1263K77	404H77
2778C3901	3/8	E	1263K77	404H77
2778C3902	3/8	E	1263K77	404H77
2778C3904	3/8	E	1263K77	404H77
2778C4900	1/2	E	1535H77	404H77
2778C4901	1/2	E	1535H77	404H77
2778C4902	1/2	E	1535H77	404H77
2778C4904	1/2	E	1535H77	404H77
2778C5900	3/4	E	1264K77	404H77
2778C5901	3/4	E	1264K77	404H77
2778C5902	3/4	E	1264K77	404H77
2778C5904	3/4	E	1264K77	404H77
2778A6900	1	E	1264K77	404H77
2778A6901	1	E	1264K77	404H77
2778A6902	1	E	1264K77	404H77
2778A6904	1	E	1264K77	404H77

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X/EEZ-ON®** products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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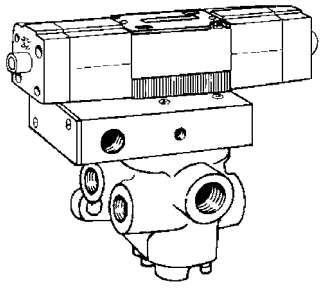
Series 27 Valves & Adaptors

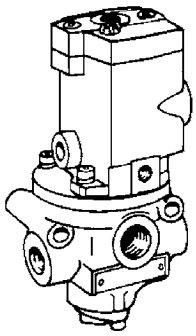
Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a poppet valve designed for inline mounting, and has been built to the highest standards.

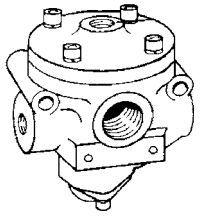
With care in its installation and maintenance, you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains. A general service manual with more detailed information is available from ROSS upon request. For information on Series 27 adaptors, see pages 3 & 4.



Double Solenoid Valve



Single Solenoid Pilot Valve



Pressure Controlled Valve

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Important Note: *ROSS Series 27 valves are* ***not*** *designed as control valves for air clutch/brake mechanisms on mechanical power presses, and must not be installed for such use. Only double valves conforming to OSHA standards shall be used in such applications.*

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element.

Valve Outlets (Ports 2 and 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Port 3): Do not restrict the air flow from the exhaust port of the valve body or pilot body as this can adversely affect the operation of the valve. However, to reduce exhaust noise, an efficient silencer may be used. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the pilot housing. The electrical supply must correspond to these ratings. Otherwise the solenoids are subject to early failure. If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:

Pressure Control: Connect a 1/4-inch control line to the threaded port in the air cap at the top of the valve. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for the pilot valve is supplied internally for most valves, and requires no special connection. However, if your valve is designated for external pilot supply, a 1/8-inch pilot supply line must be connected to port X-1 in the pilot housing. See *Valve specifications* on page 2 for pressure requirements.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that this valve itself does not require air line lubrication, but some optional adaptors do, i.e. air index, etc.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation.

Service kits for these valves are listed on page 5. Service kits for adaptors are listed on pages 3 and 4.

VALVE SPECIFICATIONS

Pressure Controlled

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure:

1/4 to 1-1/2 Port Sizes: 15 to 150 psig (1 to 10 bar).
1-1/2 to 2-1/2 Port Sizes: 30 to 150 psig (2 to 10 bar).
2/2 EEZ-ON®: 30 to 150 psig (2 to 10 bar) for all sizes.

Pilot Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 6.

Solenoid Pilot

Solenoids: Rated for continuous duty. Voltage and Hertz ratings shown on pilot housing.

Power Consumption:

Single Solenoid: 87 VA inrush, 30 VA holding on AC; 14 watts on DC.
Double Solenoid: Each solenoid, 190 VA inrush, 40 VA holding on AC; 20 watts on DC.

Temperature Range:

Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure:

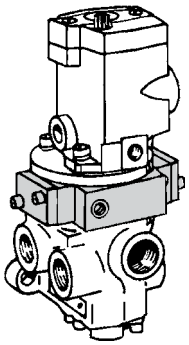
1/4 to 1-1/2 Port Sizes: 15 to 150 psig (1 to 10 bar).
1-1/2 to 2-1/2 Port Sizes: 30 to 150 psig (2 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure.

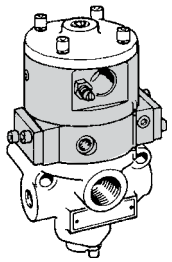
Series 27 Adaptors

Some Series 27 ROSS valves have special-function adaptors installed between the valve body and the solenoid pilot (or air head). Examples of two valves with special function adaptors are illustrated at the right.

Lubrication Note: Valves using these adaptors (except L-O-X® and EEZ-ON® adaptors) require air line lubrication.



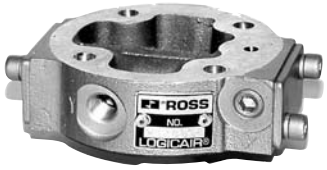
4-Way solenoid pilot valve with air index adaptor.



3-Way pressure controlled valve with timed-in adaptor plus Q adaptor.

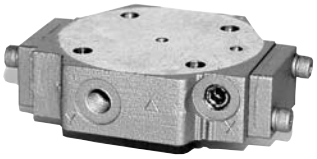
Q ADAPTOR

The Q adaptor is used with the timed-sequence adaptors to extend the timing interval up to 60 seconds. It also ensures "snap" action of the valve by keeping pilot pressure off the main valve piston until it has built up high enough to cause prompt valve response.



All Sizes: order model number W421B93.

AIR INDEX ADAPTOR



Air Index Adaptor

The air index adaptor allows a valve controlled by a single signal source (solenoid pilot or remote pressure control) to function as an impulse-controlled mechanically-detented valve. A momentary electrical signal to the solenoid actuates the valve and holds it in the actuated position. A second momentary signal from the same source returns the valve to its deactuated position.

All Sizes: order model number W674B93.

L-O-X® and EEZ-ON® ADAPTORS

The ROSS valves with EEZ-ON® adaptors are used in air supply lines to give an adjustable, gradual buildup of pressure at startup time. ROSS valves with L-O-X® adaptors are used in air supply lines to provide a lockable shut off of the air supply and also exhaust downstream air when shut-off. The L-O-X® adaptor offers low-friction seals which ensure easy shifting even after a long standby period and can be padlocked only in the closed position.

Series 27 L-O-X® adaptors are not field serviceable. If they require service, they should be replaced or returned to ROSS for rebuilding.

Valve shown with both L-O-X® and EEZ-ON® adaptors.

L-O-X® Adaptor

EEZ-ON® Adaptor

Valves	Size	Adaptors EEZ-ON®	Adaptors L-O-X®
2/2 EEZ-ON®	1/4 to 1	271A86	--
	1 to 1½	266A86	--
3/2 EEZ-ON®	1/4 to 1	389A86	--
	1 to 1½	396A86	--
3/2 L-O-X®	1/4 to 1½	--	339B86
	1½ to 2½	--	409B86
3/2 L-O-X with EEZ-ON® operation	1/4 to 1	396A86	390B86
	1 to 1½	396A86	390B86

PB ADAPTORS

4-way PB Adaptor

3-way PB Adaptor

The "PB" adaptor increases the actuating force on the valve piston. It should be used when inlet and pilot pressures are below the minimums specified for the valve. It should also be used when an external pilot supply with a lower pressure than the inlet pressure is used. The valve's pilot pressure is applied to a piston in the "PB" adaptor that has a larger area than the piston in the valve. The force on the piston in the adaptor is thereby larger than that which could be produced by the piston in the valve. This larger force is applied to the valve's piston directly so that there is then sufficient force to shift the valve properly.

	Adaptor Number Body Size		
Description	**3/8**	**3/4**	**1¼**
For 2-way valve	168A86	168A86	169A86
For 3-way valve	168A86	168A86	169A86
For 4-way valve	170A86	171A86	172A86

HSR® ADAPTOR

HSR® Adaptor

The HSR® valve has two inlet ports. To produce an output signal, two separate but equal input pressure signals must be applied within approximately 0.5 seconds of one another. If this allowable time delay is exceeded, the HSR® valve will shift and prevent any output signal. If signalled to actuate within the allowable time delay, the HSR® valve will shift and pressurize outlet port (2). The output signal will be exhausted if (1) either input signal is removed, or (2) the pressure of the output signal is reduced by 25% or more. The HSR valve will reset itself when both input signals are removed. Coupled to an inline valve body, it gives two hand control over a larger volume of outlet air.

NOTE: HSR® adaptors are not field serviceable. If the assemblies require service, they should be replaced or returned to ROSS for rebuilding.

TIMED-SEQUENCE ADAPTORS

Dual Timed Adaptor

Timed-Out Adaptor

Timed-In: Solenoid energized; after preset delay valve is actuated. Solenoid de-energized; valve immediately de-actuated.
Timed-Out: Solenoid energized; valve immediately actuated. Solenoid de-energized; after preset delay valve is de-actuated.
Dual Timed: Solenoid energized; after preset delay valve is actuated. Solenoid de-energized; after preset delay valve is de-actuated.
NOTE: Upper stem assembly is for timed-in control; lower stem assembly is for timed-out control.

Description	**Adaptor Number**
Dual Timed Adaptor	996K87
Timed-In Adaptor	490B93
Timed-Out Adaptor	489B93

CONVERSION TO EXTERNAL PILOT SUPPLY

When a valve is converted to external pilot supply, consult ROSS for the converted valve's model number. This will allow records and drawings to be changed and prevent errors when ordering future replacements.

INLINE POPPET VALVES: See Figure 1.

1. Remove pilot section and adaptor plate from valve body.
2. Remove pipe plug from external pilot supply port, and reinstall the plug in the internal pilot supply passage.
3. Replace adaptor plate and pilot section.
4. Attach 1/8" pilot supply line to external pilot supply port (X-1).
5. External pilot supply pressure must be at least equal to the main supply pressure.

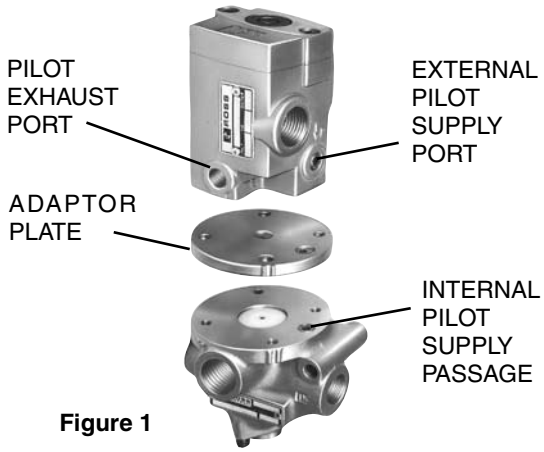
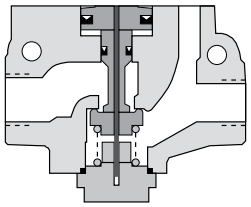
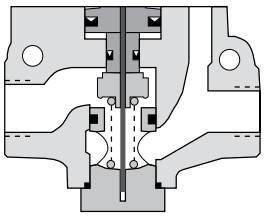


Figure 1

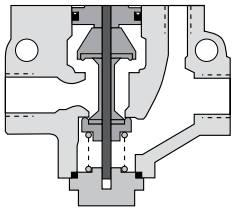
SERIES 27
VALVE BODIES



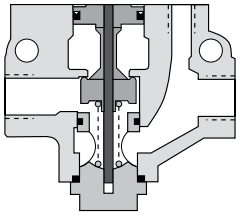
2/2 Normally Closed



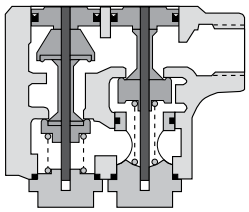
2/2 Normally Open



3/2 Normally Closed



3/2 Normally Open



4/2

VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center (1-800-438-7677 inside the U.S. or 706-356-3708 outside the U.S.). However, if you choose to service this valve yourself, it is strongly recommended that you obtain a free service manual from your local ROSS distributor. Distributor information as well as downloadable service manuals are available at www.rosscontrols.com.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindle, all required gaskets and seals, and instructions for use.

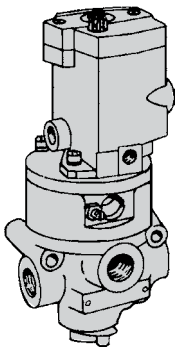
Gasket and Seal Kits. These kits are needed when valve bodies are disassembled for cleaning. They include all the necessary gaskets, O-rings, and other seals.

Solenoid Pilot Kits. These kits contain all parts needed to recondition the pilot valve. Order by the following kit numbers:

For single solenoid pilots: **946K87**
For double solenoid pilots: **273K87**

Solenoids. Replacement solenoids can be ordered by the part numbers listed below. Specify the required voltage and hertz when ordering.

For single solenoid pilots: **411B04**
For double solenoid pilots: **171C95**



Timed sequence adapter shown between the solenoid pilot and the valve body.

Adapters. Some valves have adapters (e.g., time delay, PB, air index, or L-O-X® adapters) above the valve body. For information on servicing these adapters, see pages 3-4 or consult ROSS.

Valve Type	Port Sizes	Valve Body Kit Number*	Gasket & Seal Kit*
2/2 Normally Closed	1/4, 3/8, 1/2	501K87	513K87
	1/2, 3/4, 1	502K87	514K87
	1, 1¼, 1½	503K87	515K87
	1½, 2, 2½	547H77	—
2/2 Normally Open	1/4, 3/8, 1/2	504K87	513K87
	1/2, 3/4, 1	505K87	514K87
	1, 1¼, 1½	506K87	515K87
	1½, 2, 2½	548H77	—
3/2 Normally Closed	1/4, 3/8, 1/2	495K87	510K87
	1/2, 3/4, 1	496K87	511K87
	1, 1¼, 1½	497K87	512K87
	1½, 2, 2½	814K77	—
3/2 Normally Open	1/4, 3/8, 1/2	498K87	510K87
	1/2, 3/4, 1	499K87	511K87
	1, 1¼, 1½	500K87	512K87
	1½, 2, 2½	550H77	—
4/2	1/4, 3/8, 1/2	492K87	507K87
	1/2, 3/4, 1	493K87	508K87
	1, 1¼, 1½	494K87	509K87

* Except EEZ-ON® adaptors. Consult ROSS for information.

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Series 31 and 36 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a hand-or-foot operated poppet valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports 2 & 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict exhaust air flow as this can adversely affect valve performance. However, to reduce noise use an efficient silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

SERIES 31

4/3 VALVES

Port sizes: 3/8 to 1¼

Horizontal or vertical lever.

4 Ports; located on bottom of valve.

3-Position control; detented or non-detented.

Center position: Outlet ports in models ending in 07, 08, 09, or 12 are open to exhaust; models ending in 10, 11, 13, or 14 are closed to exhaust.

SERIES 36

3/2 VALVES

Port size: 1/4

Horizontal lever, vertical lever, pedal, or treadle.

3 Ports; located on sides of valve.

2-Position control; detented or spring return.

4/2 VALVES

Port size: 1/4

Horizontal lever, vertical lever, pedal, or treadle.

4 Ports; located on sides of valve.

2-Position control; detented or spring return.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron rated air filter located close to the valve as possible is strongly recommended. The filter bowl should be drained regularly, and if the filter's location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate: A lubricator should put atomized oil into the air line in direct proportion to the rate of air flow. Excessive air line lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute of air flow is adequate. (Note that your ROSS valve itself does not require air line lubrication.) See next column for a partial list of lubricants that are compatible with ROSS valves and are suitable for use in compressed air systems.

Cleaning Valve: If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance. Although ROSS poppet valves are very tolerant of dirty air, cleaning may sometimes be needed.

To clean the valve use any good commercial solvent or kerosene. Do not use a chlorinated solvent or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts.

Before reassembling the valve lubricate all sliding surfaces with a grease equivalent to Mobil Grease 28 lubricant.

Replace Worn Components: After long usage the poppets may show signs of wear. The valve can be reconditioned with the use of ROSS service kits. See page 3 for information about such kits.

COMPATIBLE LUBRICANTS

Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and thereby cause the valve to malfunction. The best oils to use are those specifically compounded for air line lubricator service. These are generally petroleum, base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity. A few of the compatible lubricants on the market are listed below.

Maker	Brand Name
Amoco	American Industrial Oil 32
	Amoco Spindle Oil C
	Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22
	Teresstic 32
Gulf	Harmony 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11
	Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

VALVE SPECIFICATIONS

SERIES 31

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 5 to 150 psig (0.3 to 10 bar).

SERIES 36

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 5 to 125 psig (0.3 to 8.5 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

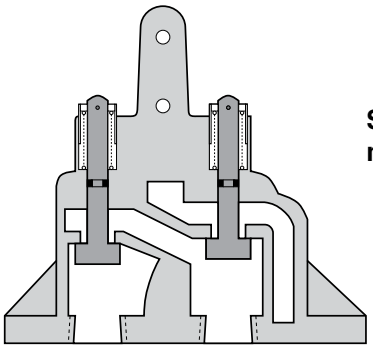
VALVE SERVICE

Valve Body Service Kits: These kits contain all of the internal parts needed to recondition a valve body. Included are poppet and stem assemblies, springs and retainers, gaskets and seals, plus instructions for use.

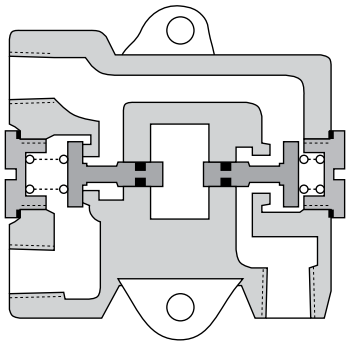
Locking Rocker Kits: Contain rocker and associated hardware for models with detented action (model numbers ending in 07, 09, 10, or 13).

Spring & Retainer Kits: Contain four poppet springs and retaining hardware. These parts are already included in valve body service kits.

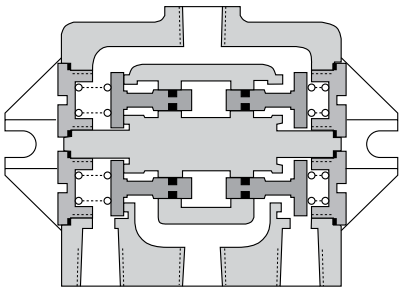
VALVE BODY CROSS SECTIONS



Series 31 models



Series 36 3/2 models



Series 36 4/2 models

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

SERVICE KITS

Valve Model Number	Valve Body Service Kit	Locking Rocker Kit	Spring & Retainer Kit
3126A3007	829K77	919K87	376K77
3126A3008	829K77	1012 1/2	376K77
3126A3009	829K77	919K87	376K77
3126A3010	690K87	919K87	376K77
3126A3011	690K87	1012 1/2	376K77
3126A3012	829K77	1012 1/2	376K77
3126A3013	690K87	919K87	376K77
3126A3014	690K87	1012 1/2	376K77
3126A4007	830K77	920K87	377K77
3126A4008	830K77	1032 1/2	377K77
3126A4009	830K77	920K87	377K77
3126A4010	691K87	920K87	377K77
3126A4011	691K87	1032 1/2	377K77
3126A4012	830K77	1032 1/2	377K77
3126A4013	691K87	920K87	377K77
3126A4014	691K87	1032 1/2	377K77
3126A5007	692K87	921K87	378K77
3126A5008	692K87	1052 1/2	378K77
3126A5009	692K87	921K87	378K77
3126A5010	692K87	921K87	378K77
3126A5011	692K87	1052 1/2	378K77
3126A5012	692K87	1052 1/2	378K77
3126A5013	692K87	921K87	378K77
3126A5014	692K87	1052 1/2	378K77
3126A6007	693K87	922K87	379K77
3126A6008	693K87	1072 1/2	379K77
3126A6009	693K87	922K87	379K77
3126A6010	693K87	922K87	379K77
3126A6011	693K87	1072 1/2	379K77
3126A6012	693K87	1072 1/2	379K77
3126A6013	693K87	922K87	379K77
3126A6014	693K87	1072 1/2	379K77
3126A7007	694K87	922K87	380K77
3126A7008	694K87	1072 1/2	380K77
3126A7009	694K87	922K87	380K77
3126A7010	694K87	922K87	380K77
3126A7011	694K87	1072 1/2	380K77
3126A7012	694K87	1072 1/2	380K77
3126A7013	694K87	922K87	380K77
3126A7014	694K87	1072 1/2	380K77
3623A2003	683K87	—	—
3623A2004	683K87	—	—
3623A2005	683K87	—	—
3623A2006	683K87	—	—
3626A2003	684K87	—	—
3626A2004	684K87	—	—
3626A2005	684K87	—	—
3626A2006	684K87	—	—
3643A2001	683K87	—	—
3643A2002	683K87	—	—
3646A2001	684K87	—	—
3646A2002	684K87	—	—

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Series 35 Double Valves

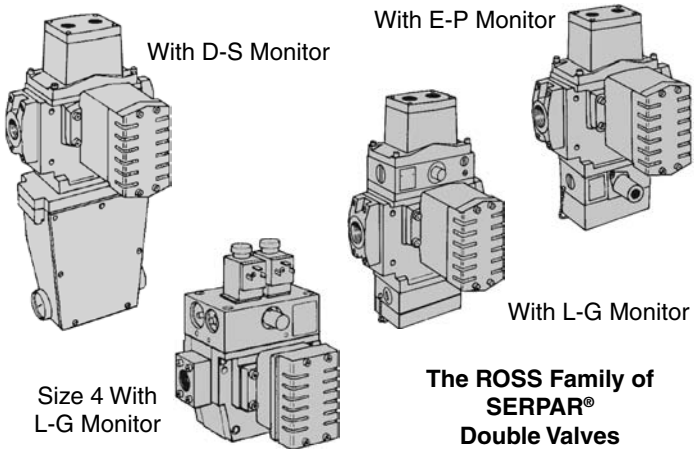
Thank You!

You have purchased a premium-quality ROSS® pneumatic valve.

It is a double valve designed to offer added safety to the operation of many pneumatically controlled machines. When properly installed, it conforms with the OSHA standards for control of air clutch/brake mechanisms used on certain mechanical power presses.

With care in its installation and maintenance you can expect it to have a long and reliable service life. Before you go any further, please take a few minutes to look over the information in this folder, and save it for future reference.

Service manuals with additional information are available from ROSS upon request.



The ROSS Family of SERPAR® Double Valves

VALVE INSTALLATION

WARNINGS:
(Valves Without Monitor) *If your valve does not have its own monitor, the valve must be connected to an external monitoring system, which ensures that press operation will be inhibited in the event of a malfunction.*
(Valves with E-P, L-G, or D-S Monitor) Both solenoids must be de-energized before resetting the monitor. Otherwise, the press or other mechanism can cycle immediately, and could result in personal injury and/or property damage.
(Valves with E-P Monitor) This product is a dual input device which requires two separate and distinct inputs. Connect inputs only to terminals 1, 3 & 5. Using a single input or connecting an input to a terminal other than 1, 3 & 5 could result in personal injury and/or property damage.

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (see *Valve Specifications, page 3),* but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may be locked out by the monitoring system.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict air flow from the exhaust port as this can adversely affect valve operation.

Pilot Solenoid Electrical Supply: Size 4 valves get electrical power through plug-in connectors. All larger valves have an internal terminal strip which must be connected according to the circuit diagram accompanying the valve. In either case, the electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* for inrush current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperature are given in the *Valve Specifications* on page 3. Exceeding the values shown can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

Monitor: Connect the wiring according to the circuit diagram supplied with the valve. A lockout signal port (on valve models with L-G monitor) can be connected to a normally closed pressure switch to operate a lockout indicator light.

After installation, the monitor (L-G, E-P, D-S and/or external monitor) must be tested for proper functioning. Take normal press operation safety precautions during these tests to avoid personal injury or damage to equipment. Electrically energize both solenoids; depress one manual override; de-energize both solenoids. This should result in a valve lockout and prevent the valve from operating. Reset the monitor, and repeat the test using the second manual override. Contact ROSS for testing procedures for valves without manual overrides. After satisfying these tests, energizing both solenoids simultaneously should result in normal valve operation.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE OPERATION

Normal Operation: After installation, the valve is operated by energizing both pilot solenoids simultaneously. This causes both main valve elements to open so that inlet air (port 1) flows to the outlet (port 2). When the solenoids are de-energized, both valve elements close. Air no longer flows from inlet to outlet, but downstream air is exhausted through port 3.

Detecting a Malfunction: If the main valve elements do not both open or close at the same time, the valve's monitor detects this condition and locks the valve out so that it cannot be cycled. Each of the monitors detects a malfunction in somewhat different ways, but the end result is the same: a malfunction shuts down the valve. The valve cannot be operated again until the monitor is reset.

Resetting a Monitor: *WARNING: (E-P, L-G, & D-S Monitors) Both solenoids must be de-energized before resetting the monitor. Otherwise, the press or other mechanism can cycle immediately, and could result in personal injury and/or property damage.*

Resetting the L-G Monitor: Size 4 models have either a manual reset button or a pneumatic reset port. All other sizes have a pneumatic reset port only.

Models with a manual reset button (on the side of the monitor housing) have the monitor reset simply by pushing the reset button.

Models with a pneumatic reset port (also on the side of the monitor housing) must have a line supplying air pressure attached to the port, and a small 3/2 reset valve to control the pressure. Size 4 valves require a pressure of at least 30 psig (2 bar), and larger sizes require a pressure of at least 60 psig (4 bar). Applying pressure to the reset port resets the monitor so that normal operation can be resumed.

Resetting the E-P Monitor: The E-P monitor is reset electrically. A solenoid wired through terminals 8 and 9 resets the monitor when energized. Energize the reset solenoid only briefly; prolonged energization can burn it out.

Resetting the D-S Monitor: An external switch connected to terminals G and H is used to reset the monitor. Closing the switch *momentarily* will reset the monitor after a delay of about two seconds. Reset can also be accomplished by *momentarily* interrupting the power supply to the monitor.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that the double valve itself does not require air line lubrication.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance. This can cause sluggish or erratic valve action and nuisance lockouts. A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do *not* use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Service kits are listed on page 3. You may also request a free service manual from ROSS in the U.S.A. at 1-800-GET-ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all the WARNINGS on page 1 and the CAUTIONS on page 4.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32
	Amoco Spindle Oil C
	Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22
	Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11
	Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

VALVE SPECIFICATIONS

E-P MONITOR: Reset solenoid is rated only for intermittent duty. Energizing it continuously will lead to solenoid burnout and nullify the reset function. Permissible voltage range is marked on the solenoid housing.

L-G MONITOR: Reset pressure requirements.

Size 4: At least 30 psig (2 bar).
Sizes 8, 12, 30: At least 60 psig (4 bar).

D-S MONITOR: Use voltage and hertz as shown on D-S monitor label. Power supply must be independent and continuous.

IMPORTANT NOTE: Please read carefully and thoroughly all the WARNINGS on page 1 and the CAUTIONS on page 4.

Solenoids: Two, rated for continuous duty. Voltage and hertz ratings shown on pilot housing.

Power Consumption: Each solenoid.
Size 4: 30 VA inrush, 16 VA holding on AC; 11 watts on DC.
Sizes 8, 12, 30: 87 VA inrush, 30 VA holding on AC; 14 watts on DC.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure:
Size 4: 30 to 100 psig (2 to 7 bar).
Sizes 8, 12, 30: 30 to 125 psig (2 to 8.5 bar).

Pilot Pressure: Supplied internally from inlet port.

VALVE SERVICE

ROSS would be happy to service this specialized valve for you at its factory repair center (1-800-GET-ROSS). However, if you choose to service this valve yourself, it is strongly recommended that you obtain its free service manual from ROSS in the U.S.A. at 1-800-GET-ROSS.

Listed below are kits for servicing double valves. They contain the parts required to recondition pilots and valve bodies. Service kits for monitors are also available; consult ROSS.

Valve Size	Port Sizes	Monitor Type	Valve Body Service Kit	Gasket Seal Kit	Monitor Service Kit	Lockout Kit	Reset Solenoid	Adaptor Kit
4	3/8, 1/2, 3/4	L-G	541K77	—	545K77	542K77	—	—
8	1/2, 3/4, 1	E-P	429K77	438K77	421K77	—	422K77	—
		L-G	428K77	437K77	416K77	418K77	—	—
		D-S	430K77	439K77	—	—	—	423K77
12	3/4, 1, 1¼	E-P	432K77	441K77	421K77	—	422K77	422K77
		L-G	431K77	440K77	416K77	418K77	—	422K77
		D-S	433K77	442K77	—	—	—	423K77
30	1¼, 1½	E-P	435K77	444K77	421K77	—	422K77	—
		L-G	434K77	443K77	416K77	418K77	—	—
		D-S	436K77	445K77	—	—	—	423K77

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindles, gaskets, seals, and instructions for use.

Gasket and Seal Kits. These kits are needed when valve bodies are disassembled for cleaning. Included are all necessary gaskets, O-rings, other seals and lubricants. These parts are included in the *Valve Body Service Kits* above.

Solenoid Pilot Kit. This kit contains all parts needed to recondition one pilot valve of size 8, 12, and 30 double valves. Order kit number **946K87** (two kits required for each valve).

Solenoids. Order replacement solenoids or solenoid coils by the following part numbers (specify voltage and hertz):

Size 4: Solenoid coil only, **290B33.**

Sizes 8, 12, 30: Complete solenoid, **411B04.**

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at: **1-888-TEK-ROSS** or 1-706-356-3708.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Series 35 Sizes 1 and 2
Double Valves for *External* Monitor

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a Crossflow™ double valve designed for use *with a suitable external monitor*. The external monitor must ensure that the operation of the double valve is inhibited should there be a malfunction in the system impacting proper valve functions.

With care in its installation and maintenance, you can expect your valve to have a long and reliable service life. Before you go any further, please take a few minutes to look over the information in this folder, and save it for future reference.

Size 1 Valve

Size 2 Valve

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (see *Valve Specifications, page 3),* but must also provide an adequate flow of air on demand.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict air flow from the exhaust port as this can adversely affect the operation of the valve.

Pilot Solenoid Electrical Supply: Size 1 and 2 double valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* for inrush current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 3. Exceeding the values shown can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

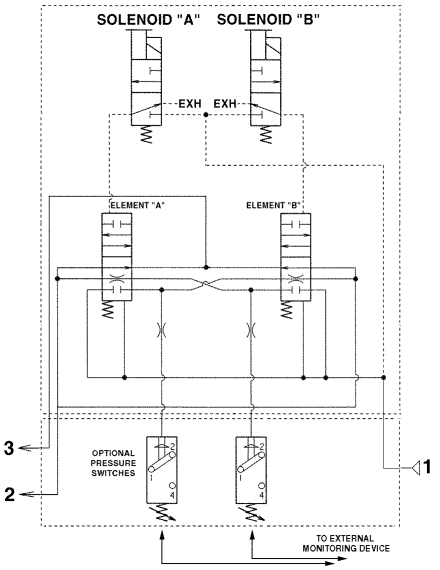
Monitor: These valves do not have their own monitors. *They must be connected to an external monitoring system that ensures that valve operation will be inhibited should a system malfunction occur. If controlling a critical element of machinery affecting safety, i.e., press brake, the valves must be connected to an external monitor.*

Pressure Switches: Some models have two pressure switches that sense that the two valve elements did not move together. The pressure switches are only indicators that the valve elements did not move in step with one another, and the switches will not lock out the valve. They should not be confused with a monitor.

Each pressure switch has four electrical contacts. Contacts 1 and 2 are closed when no air pressure signal is applied to the switch. Contacts 1 and 4 are closed when an air pressure signal is applied to the switch. Contact 3 is for a ground connection. For further information in the use or connection of the pressure switches call your local ROSS distributor or location below, or , in the U.S.A., call *ROSS Technical Service at 1-888-TEK-ROSS.*

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE OPERATION



Model illustrated has two pressure switches

Normal Operation: After installation the valve is operated by energizing both pilot solenoids simultaneously. This applies inlet air pressure to the pistons of both main valve elements, and causes them to open so that inlet air (port 1) flows to the outlet (port 2). At this time, the pressure switches have air and contacts 1 & 4 on the pressure switch should be closed. When the solenoids are de-energized, both main valve elements close. Air no longer flows from inlet to outlet, and downstream air is exhausted through port 3. At this time, air is removed from the pressure switches and contacts 1 & 2 on the pressure switches should be closed.

Detecting a Malfunction: The valve *MUST* be connected to an external monitoring system so that if the main valve elements do not both open or close at the same time, the monitor will detect this condition and lock the valve out so that it cannot be cycled. For further information in the use or connection of the pressure switches call *ROSS Technical Service at 1-888-TEK-ROSS.*

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the system and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that the double valve itself does not require air line lubrication.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Service kits are listed on page 3.

VALVE SPECIFICATIONS

Solenoids: Two, rated for continuous duty. Voltage and hertz ratings shown on solenoid coil.

Size 1- Power Consumption: Each solenoid. 12 VA inrush, 9.8 VA (max) holding on 50 or 60 hertz; 7.5 watts (max) on DC.

Size 2- Power Consumption: Each solenoid. 11 VA inrush, 8.5 VA (max) holding on 50 or 60 hertz; 6.0 watts (max) on DC.

Electrical Connections: (Must be purchased separately; see charts at the right.) Cord-grip connector at each solenoid.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 40 to 100 psig (2.8 to 7 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Size 1- Part Numbers of Electrical Connectors

Connector Type	Without Light	With Light*
For use with dropcord (cord not included)	266K77	267K77
Wired with 10-mm cord (cord exits upward)	372K77	382K77

*Specify solenoid voltage.

Size 2- Part Numbers of Electrical Connectors

Connector Type	Without Light	With Light*
For use with dropcord (Cord not included)	937K87	936K87
Wired with 6-mm cord	721K77	720K77
Wired with 10-mm cord	371K77	383K77
For use with threaded conduit	723K77	724K77

*Specify solenoid voltage.

VALVE SERVICE

ROSS would be happy to service this specialized double valve for you at its factory repair center. Call your local distributor or (in the U.S.) **1-800-GET-ROSS** for information.

If you service the valve yourself, be sure to turn off electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Listed below are kits for servicing Size 1 and 2 Crossflow double valves, as well as replacement solenoid information.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindles, gaskets, seals, and instructions for use.

Size 1.....**1579K77**

Size 2.....**1581K77**

Solenoid Coils. Order replacement solenoid coils by the following part numbers. Specify voltage and hertz when ordering.

Size 1.....**308K33**

Size 2.....**306K33**

Gasket and Seal Kits. These kits are needed when valve bodies are disassembled for cleaning. They include all necessary gaskets, O-rings, and other seals. These parts are included in the *Valve Body Service Kits* above.

Size 1.....**1580K77**

Size 2.....**1652K77**

Complete Solenoid Pilot Assemblies: These assemblies consist of new pilot valve mechanisms and a new solenoid coil, ready to bolt in position on the valve. Specify voltage and hertz when ordering.

Size 1.....**936C79**

Size 2.....**851C79**

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS146

Series 35 SERPAR® Double Valves with Dual Monitoring

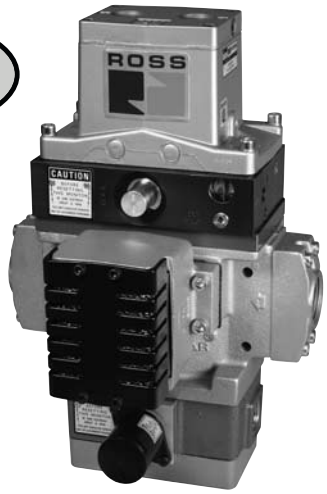
Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a Serpar® double valve designed to offer added safety to the operation of many pneumatically controlled machines. When properly installed, it conforms with the OSHA & CSA standards for control of air clutch/brake mechanisms used on certain mechanical power presses.

With care in its installation and maintenance, you can expect the valve to have a long and reliable service life. Before you go any further, please take a few minutes to look over the information in this folder, and save it for future reference.

Size 8 Dual Monitored Double Valve

CSA Z142 Compliant



VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve. See ROSS Bulletin 420 for available filter products.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (see *Valve Specifications, page 3),* but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may be locked out by the monitoring system.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size, and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict air flow from the exhaust port as this can adversely affect the operation of the valve.

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

Electrical Supply: Electrical supply for the pilot solenoids and the E-P reset solenoid is connected via an internal terminal strip, which must be connected according to the circuit diagram accompanying the valve. In either case, the electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, the transformer must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 3 for inrush current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 3. Exceeding the values shown can adversely affect performance, and shorten valve life.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

Monitors: Connect the wiring according to the circuit diagram supplied with the valve. An L-G lockout signal port (on same side as reset port) can be connected to a normally closed pressure switch to operate a lockout indicator light.

Once the valve is installed, the monitoring function of the valve must be tested. See TEST PROCEDURE on page 3.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
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ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE OPERATION

Normal Operation: After installation the valve is operated by energizing both pilot solenoids simultaneously. This causes both main valve elements to open so that inlet air (port 1) flows to the outlet (port 2). When the solenoids are de-energized, both valve elements close. Air no longer flows from inlet to outlet, but downstream air is exhausted through port 3.

Detecting a Malfunction: If both main valve elements do not open or close at the same time, one or both of the valve's monitors will detect this condition and lock the valve out so that it cannot be cycled. The L–G and E–P monitors detect discordance in somewhat different ways, but the end result is the same; discordance in the shifting of the two main valve elements shuts down the valve. The valve cannot be operated again until the locked out monitor(s) are reset.

Resetting a Monitor:

CAUTION: *Before resetting any monitor, power to the pilot solenoids must be turned off. Otherwise, the press or other mechanism controlled by the valve will cycle immediately and produce a potentially hazardous condition.*

Resetting the L-G Monitor: The L-G monitor is reset pneumatically, and must have a line supplying air pressure attached to the pneumatic reset port (on the side of the L-G monitor housing). Also, a small 3/2 normally closed reset valve (either solenoid or manual), to control the reset signal, should be installed in this line. The L-G monitor requires a reset pressure of at least 60 psig (4 bar). Applying pressure momentarily to the reset port resets the monitor so that normal operation can be resumed.

Resetting the E-P Monitor: The E-P monitor is reset electrically. An electrical signal applied to terminals 1 and 9 energizes the reset solenoid, which, in turn, resets the monitor. Energize the reset solenoid only briefly; prolonged energization can burn the solenoid out.

Coordination of Reset Signals: The L-G and E-P monitors operate independently to lock out the valve so that it cannot be cycled after a discordance in the shifting of the two main valve elements is detected. Sometimes only one of the two monitors will lock out, and other times, both will lock out. It is recommended that, after a lock out occurs, reset signals should be provided to both monitors in accordance with the instructions provided, in the paragraphs above, before attempting to resume normal operation.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate: A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that the double valve itself does not require air line lubrication.)

Compatible Lubricants: Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve: If the air supplied to the valve is not well filtered, the interior of the valve may accumulate dirt and varnish, which can affect the valve's performance. This can cause sluggish or erratic valve action and nuisance lockouts. A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do *not* use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

Electrical Contacts: In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components: In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Service kits are listed on page 3.

VALVE SPECIFICATIONS

Pilot Solenoid: Two, rated for continuous duty.
Standard Voltages: 100 – 110 volts 50 Hz;
100 – 120 volts 60 Hz; 24 volts DC.
Power Consumption: Each solenoid, 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.
E–P Reset Solenoid: Rated for intermittent duty. *Standard Voltages:* Same as above for pilot solenoids.

Electrical Connections: Terminal Strip
Ambient Temperature: 40° to 120°F (4° to 50°C).
Media Temperature: 40° to 175°F (4° to 80°C).
Flow Media: Filtered air; 5 micron recommended.
Inlet Pressure: 30 to 125 psig (2 to 8.5 bar).
L–G Reset Pressure: 60 psig (4 bar) minimum.

TEST PROCEDURE

Once the valve is installed, the monitoring functions of the valve must be tested. While testing the monitoring functions, take standard press operation safety precautions to avoid personal injury or damage to equipment.

Step 1: Electrically energize both pilot solenoids.

Step 2*: Depress one of the manual overrides and hold depressed.

Step 3*: De-energize both pilot solenoids while continuing to hold the manual override depressed for at least 1 second after de-energizing the solenoids.

Performing steps 1 through 3 should result in a valve lockout and prevent the valve from operating. Do not attempt to reset either monitor before performing steps 4 and 5.

Step 4: Determine whether or not the L–G monitor has locked out. Locate the vent on the back of the L–G monitor and check for a continuous stream of air exhausting from the vent. If air is not exhausting from the vent, the L–G monitor has not locked out properly.

Step 5: Determine whether or not the E–P monitor has locked out. Electrically energize both pilot solenoids and listen for the sound of the solenoids shifting. If the solenoids shift, the E–P monitor has not locked out properly.

Step 7: De-energize both pilot solenoids. Next, reset both monitors following procedures outlined on page 2. Note that once both monitors are reset, the leakage from the back of the L–G monitor should stop.

Step 8*: Repeat steps 1 through 7 using the other manual override this time.

*NOTE: If your valve is not equipped with manual overrides, step 2 should be replaced with “remove the input signal from one pilot solenoid.” Replace step 3 with “De-energize both pilot solenoids.” Also, step 8 should read “Repeat steps 1 through 7 using the other pilot solenoid this time.”

NOTE: Occasionally one monitor may lockout the valve before the other monitor has had time to react. Contact ROSS Technical Services for further instructions should this occur.

WARNING: *Both pilot solenoids must be de-energized before resetting the monitors. Otherwise, the press or other mechanism can cycle immediately and produce a potentially hazardous condition.*

WARNING: *Do not connect power input signals directly to both terminals 5 and 7 as this could cause the machine being controlled by the valve to immediately cycle and produce a potentially hazardous condition.*

After performing the above tests and obtaining the appropriate results, energizing both pilot solenoids simultaneously should result in normal valve operation.

NOTE: The above test procedure checks for proper operation of the valve’s overall monitoring function. If you have concerns about the operation of either or both of the monitors, please contact ROSS Technical Services for further assistance.

VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center,
1-800-438-7677 inside the U.S. or 706-356-3708 outside the U.S..

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindles, gaskets, seals, and instructions for use. See chart below for kit numbers.

Gasket and Seal Kits. These kits are needed when valve bodies are disassembled for cleaning. They include all necessary gaskets, O-rings, other seals, and lubricants. These parts are included in the *Valve Body Service Kits* above. See chart below for kit numbers.

Solenoid Pilot Kit. This kit contains all parts needed to recondition one pilot valve of size 8, 12, and 30 double valves. Order kit number **946K87** (Each valve has two pilots, therefore two kits required for each valve).

Solenoids. Order replacement pilot solenoids by the following part number: **411B04** (specify voltage and hertz). See chart below for replacement E-P Reset Solenoid number (specify voltage and hertz).

Valve Size	Port Sizes	Valve Body Service Kit	Gasket Seal Kit	E–P Monitor Service Kit	L–G Monitor Service Kit	Lockout Kit (L-G)	E-P Reset Solenoid
8	1/2, 3/4, 1	2071K77	2072K77	2079H77	2078H77	2202H77	2069K77
12	3/4, 1, 1-1/4	2073K77	2074K77	2079H77	2078H77	2202H77	2069K77
30	1-1/4, 1-1/2	2075K77	2076K77	2079H77	2078H77	2202H77	2069K77

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

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3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

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AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

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POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Series 77 Sizes 2 and 4

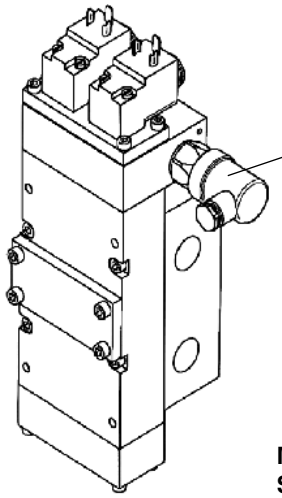
5/2 CrossMirror® Solenoid Pilot Double Valve

Thank You!

You have purchased a premium quality ROSS® pneumatic valve. It is a 4-way double valve with precision, stainless steel spools as the main valve elements, and is designed to offer added safety to the operation of many pneumatically controlled machines.

IMPORTANT NOTE: This Valve is Not Designed for Controlling Clutch/Brake Mechanisms on Mechanical Power Presses.

With care in its installation and maintenance you can expect it to have a long and reliable service life. Before you go any further, please take a few minutes to look over the information in this folder, and save it for future reference.



Model With Pressure Switch Illustrated

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.
After installation is complete, refer to Valve Operation *on page 2 to ensure that the valve is functioning properly.*

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (see *Valve Specifications, page 3),* but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may fail to operate.

Valve Outlet (Ports 2 and 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends. Port 2 is the normally open port (pressurized only when the valve is de-actuated), and port 4 is the normally closed port (pressurized only when both main valve elements have been actuated).

Valve Exhaust (Ports 3 and 5): Do not restrict air flow from the exhaust ports as this can adversely affect the operation of the valve.

Pilot Solenoid Electrical Supply: The valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 3 for inrush current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperature are given in the *Valve Specifications* on page 3. Exceeding the values shown can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe with tapered threads in the ports in the base, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228–G, etc.) do not use sealant.

Pressure Switch: If redundant monitoring is desired, ROSS offers a pressure switch version that can be used to signal another monitoring device.

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DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

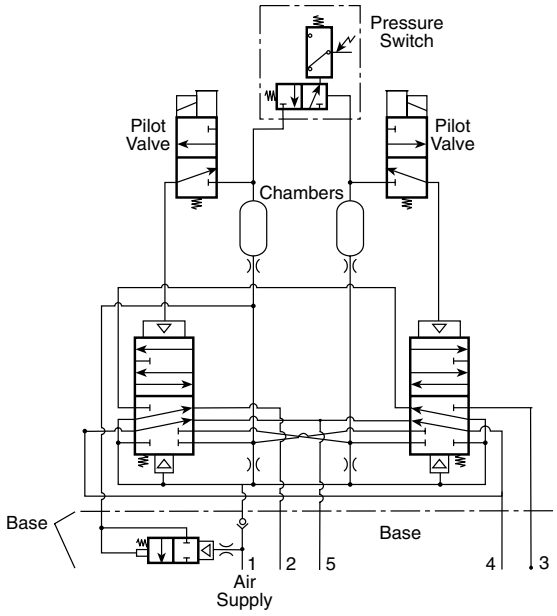
VALVE OPERATION

Normal Operation: After installation the valve is operated by energizing both pilot solenoids simultaneously. This causes both main valve elements to be actuated so that air from inlet port 1 flows to outlet port 4, but not to port 2. Air downstream of port 2 is exhausted through port 3.

When the solenoids are de-energized, both valve elements are de-actuated, and air then flows from inlet port 1 to outlet port 2, but no longer to outlet port 4. Air downstream of port 4 is exhausted through port 5.

Detecting a Malfunction: If the main valve elements are not both actuated or de-actuated at the same time, the valve defaults so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. If the malfunction was the result of a temporary circumstance, the valve will be ready to resume normal operation as soon as both solenoids have been de-energized.

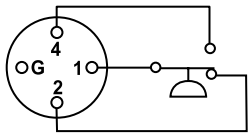
Pressure Switch: Valves with model numbers ending in the number 1 have a pressure switch to aid in detecting when the main valve elements did not move together. Out-of-step movement of the valve elements causes a pressure signal to close electrical contacts. This can be used to complete an electrical circuit in an external monitoring system.



Status Indicator (pressure switch)

Terminals 1 and 4 are connected when air pressure is present and the valve is "Ready-to-Run". If an abnormal operation has occured or pressure is removed from the valve inlet, terminals 1 and 2 are connected.

Note: DC voltage pressure switches do not have a ground terminal.



Pin 1: Common
Pin 2: Normally Closed
Pin G: Not used
Pin 4 : Normally Open

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that the double valve itself does not require air line lubrication.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with anti-wear or phosphate additives (e.g., zinc dithiophosphate), and diester oils; these substances can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed on page 3. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance by causing sluggish or erratic valve action which can result in the valve defaulting. A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve, use a solvent which will dry without leaving a residue. This is especially important for the spool and sleeve assembly. Do not use a chlorinated solvent or abrasive materials which can damage seals or metal parts. Do *not* scrape varnished surfaces.

To reassemble the spool and sleeve, put one drop of Anderol 735 (or equivalent lubricant) on each spool land. Insert the spool into the sleeve and rotate it several times to ensure even distribution of the lubricant. If the valve is used in a non-lubricated application, do not use a lubricant for reassembly which can dry out or leave a residue. Dry assembly of the spool and sleeve is preferable. Each spool and sleeve is a matched set, so care must be taken not to reverse the position of the spool in the sleeve.

Before inserting the spool-and-sleeve into the valve body, very lightly lubricate the O-rings with a lubricant such as those shown above. *Do not use Anderol; it causes the O-rings to deteriorate.*

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Service kits are listed on page 3.

VALVE SPECIFICATIONS

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoids: Two, rated for continuous duty.
Voltage and hertz ratings shown on pilot housing.

Power Consumption: Each solenoid.
18 VA inrush, 14 VA holding on AC; 6 watts on DC.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 40 to 150 psig (2.5 to 10 bar).

Pilot Pressure: Supplied internally from inlet port.

Pressure Switch Rating: Contact 4 amps at 250 volts AC, max. 250 volts AC.

VALVE SERVICE

Ross would be happy to service this specialized valve for you at its factory repair center (1-800-GET-ROSS).

For servicing the valve yourself, the needed service kits and components are described below.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are spools, gaskets, seals, and instructions for use.

Base Service Kits. These kits contain the seals and other parts required to recondition the valve's base.

Pressure Switch Assembly Kits. These kits contain the parts necessary to recondition the pressure switch assembly.

Replacement Pressure Switches and Switch Connectors. Part numbers for these components are shown in the chart below.

Solenoids. Order replacement solenoids or solenoid coils by the following part numbers. Be sure to specify voltage and hertz when ordering.

Solenoid coil only, **305K33**.

Complete pilot assembly, **1044H79**.

SERVICE KITS and COMPONENTS

Valve Size	Valve Model Number	Valve Body Gasket Kit	Valve Service Kit	Pressure Switch Asy. Service Kit	Pressure Switch	Switch Connector
2	7776A3400	1575K77	1576K77	1696K77	———	———
	7776A3401	1575K77	1576K77	1696K77	518E30	522E30
4	7776A4400	1577K77	1578K77	1696K77	———	———
	7776A4401	1577K77	1578K77	1696K77	518E30	522E30

If you need additional information, or have any questions about installing or servicing your valve, call ROSS *Technical Services* in the U.S.A. at:

1-888-TEK-ROSS(835-7677) or 1-706-356-3708.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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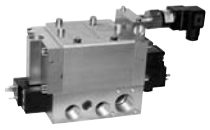
Form SS149

Series 77 3/2 CrossMirror® Valves (Sizes 2, 4 & 8)

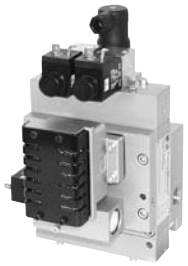
Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a high quality CrossMirror® double valve with dynamic monitoring and inherent lock-out capability. The valve is designed for base mounting for ease of installation and maintenance. With care in its installation and maintenance you can expect it to have a long and economical service life.

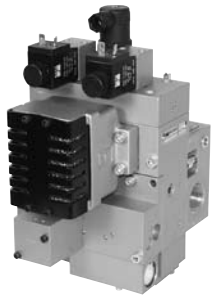
Before you install this valve, read the information in this folder completely, and save it for future reference.



Size 2



Size 4



Size 8

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing this valve in a new or existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (*see Valve Specifications, page 3*), but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may fail to operate.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict the air flow from the exhaust port as this can adversely affect the operation of the valve. Size 4 & 8 valves are factory equipped with a properly sized silencer. Size 2 valves, however, require an optional silencer to reduce exhaust noise. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Reset Port (RESET): If your valve is not equipped with a reset solenoid on the base, then the RESET port should be supplied, externally, from a 3/2 normally closed valve. The lines must be of adequate size and be free of crimps and sharp bends. Reset signals should be momentary.

Electrical Supply: 3/2 CrossMirror® double valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 3 for inrush current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 3. Exceeding these values can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228-G, etc.) do not use sealant.

Test: After installation or repair and prior to normal use, the internal lock-out feature of the 3/2 CrossMirror® valve must be tested for proper functioning. Observe normal press operation safety precautions during these tests to avoid personal injury or damage to equipment. *Note: Reset must be performed prior to beginning the test procedure. Also, both pilot solenoids must be de-energized prior to reset and must remain de-energized until after the reset signal is removed.*

A) Electrically energize both pilot solenoids simultaneously, then de-energize one pilot solenoid. This should result in a valve lockout and prevent the valve from operating. **B)** Energize both solenoids and the valve should remain in the lock-out condition. **C)** De-energize both pilot solenoids and reset the valve. **D)** Electrically energize both pilot solenoids simultaneously again. De-energize the other pilot solenoid this time. Again, this should result in a lockout. **E)** Energize both pilot solenoids. The valve should remain in a lockout condition. **F)** De-energize both pilot solenoids and then reset the valve.

After satisfying these tests, energizing both pilot solenoids simultaneously should result in normal operation.

Fault Indication: If fault indication is desired, ROSS offers a pressure switch option that can be used to signal the press controls that a fault has occurred. The pressure switch is only an indicator that the valve elements did not move in step with one another. The switch does not lockout the valve. Lockout is carried out by the design of the valve, whether the pressure switch option is used or not. The pressure switch should not be confused with a monitor. The pressure switch has 4 electrical contacts (3 on DC versions). During normal operation the pressure switch is pressurized. A lockout condition depressurizes the switch until the valve is reset. Contacts 1 and 2 are closed when the switch is depressurized (normally closed) and contacts 1 and 4 are closed when an adequate pressure signal is applied to the switch (normally open). On AC models, contact 3 is to be used as a ground connection.

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ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE OPERATION

On first operation, or after the main air supply has been removed and restored, the pilot valve supply circuit and inherent monitoring elements must be reset. This reset is accomplished by applying a momentary air signal to the RESET port or by energizing the optional reset solenoid momentarily on the sub-base. After reset, the valve will then be ready for operation.

The air supply to each pilot valve is controlled by the position of the inlet poppets. In the ready-for-operation position these poppets are held on their seats and maintain pilot air flow. During shifting of the valve elements the poppets move off seat and momentarily allow pilot air to escape to exhaust. If either valve element fails to operate correctly, the pilot supply to the other valve element will remain connected to exhaust causing the valve to lock out.

The internal monitoring system will lock out the valve if the time difference between both elements shifting fully is longer than 150 milliseconds on a size 2 valve. The time differences for size 4 and size 8 valves are 175 milliseconds and 200 milliseconds respectively. This timing is preset by restricting orifices and chambers in the pilot air circuit.

The main airflow from port 1 to port 2 is via crossflow passages between both main valves, so that both valve elements must be fully shifted in order for port 2 to be pressurized.

If the valve locks out, further operation is prevented until the valve has been reset. Electrical signals to the solenoids must be "off" to allow the valve to be reset.

The CrossMirror® valve is completely self-contained and does not need an external monitoring system.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that the double valve itself does not require air line lubrication.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out before beginning any dissasembly operation. Service kits are listed on page 3.

VALVE SPECIFICATIONS & ACCESSORIES

STANDARD SPECIFICATIONS:

Solenoids: Two, rated for continuous duty (3 with solenoid reset option).

Standard Voltages: 100-110 volts, 50 Hz; 100-120 volts, 60 Hz; 24 volts DC. Other voltages available.

Pilot Solenoids Power Consumption: Each solenoid, 30 VA inrush, 16 VA max holding on 50 or 60 Hz; 11 watts nominal on DC.

Reset Solenoid Power Consumption:

Size 4: 12 VA inrush, 8.5 VA max holding on 50 or 60 Hz; 6 watts nominal on DC.

Size 2 & 8: Same as pilot solenoids.

Ambient Temperature: 40°F to 120° F (4°C to 50° C).

Media Temperature: 40°F to 175° F (4°C to 80° C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: *Size 2:* 30 to 150 psig (2 to 10 bar).
Size 4 & 8: 40 to 100 psig (2.8 to 7 bar).

Reset Pressure: Remote reset option requires reset pressure to be greater than or equal to inlet pressure (within given range of inlet pressure).

Pressure Switch Rating: Contacts - 4 amps at 250 volts AC, maximum voltage - 250 AC.

Solenoid Reset: Units with solenoid reset include a 3/2 solenoid valve on base. Energize this solenoid momentarily to reset monitor after fault condition occurs. **NOTE:** Main solenoids must be off when performing reset procedure.

Remote Reset: Remote signal to be supplied by customer's 3/2 valve (connect remote signal line to remote RESET port in base). Apply signal momentarily to reset monitor after fault condition occurs.

Electrical Connectors

Wired connectors have a 2-meter (6 1/2 ft.) cord with three 18-gauge conductors. Cord is available in either 6-mm or 10-mm diameter and with or without indicator light. Specify solenoid voltage for lighted connectors.

	Without Light	With Light
Wired with 6-mm cord	**721K77**	**720K77**
Wired with 10-mm cord	**371K77**	**383K77**
For threaded conduit	**723K77**	**724K77**
For use with drop cord (cord not included)	**937K87**	**836K87**

VALVE SERVICE

ROSS would be happy to service this specialized double valve for you at its factory repair center. Call your local distributor or, (in the U.S.) 1-800-GET-ROSS (+706-356-3708 outside the U.S.) for information. If you service the valve yourself, be sure to turn off electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out before beginning any disassembly operation. Listed below are kits for servicing Size 2, 4 and 8 CrossMirror® double valves, as well as replacement solenoid information.

NOTE: *Before operating the CrossMirror® double valve, be sure to complete the test procedure (TEST), on page 1, upon installation and after any maintenance is performed on the valve. Failure to do so could result in personal injury or equipment damage.*

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindles, gaskets, seals, and instructions for use.

Size 2.....**2006K77**
Size 4.....**1791K77**
Size 8.....**1710K77**

Gasket and Seal Kits. These kits are needed when valve bodies are disassembled for cleaning. They include all necessary gaskets, O-rings, and other seals. These parts are also included in the *Valve Body Service Kits* above.

Size 2.....**N/A**
Size 4.....**1790K77**
Size 8.....**1711K77**

Pressure Switch Assembly Service Kit. This kit includes all parts needed for complete reconditioning of the pressure switch assembly.

Size 2.....**2008K77**
Size 4.....**1792K77**
Size 8.....**N/A**

Replacement Pressure Switches and Switch Connectors.

Size	Voltage	Pressure Switch	Switch Connector
2	AC or DC	**1018A30**	**N/A***
4 & 8	100 - 120 AC	**518E30**	**522E30**
	24 DC	**798E30**	**522E30**

*Pressure switch 1018A30 is supplied with connector.

Solenoid Coils. Order replacement solenoid coils by the following part numbers. Specify voltage and hertz when ordering.

	Pilot solenoids	Reset solenoid
Size 2	**306K33**	**306K33**
Size 4	**290B33**	**306K33**
Size 8	**290B33**	**290B33**

Complete Solenoid Pilot Assemblies. These assemblies consist of new pilot valve mechanisms and a new solenoid coil, ready to bolt in position on the valve. Specify voltage and hertz when ordering.

	Pilot solenoids	Reset solenoid
Size 2	**1044H79**	**851C79**
Size 4	**842C79**	**1044H79**
Size 8	**842C79**	**842C79**

Base Service Kits. The base service kit is used to repair the inlet shutoff included in the bases for size 2 valves.

Size 2.....**2007K77**

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

If you need additional information, or have any questions about installing or servicing your valve, call ROSS *Technical Services* in the U.S.A. at:
1-888-TEK-ROSS(835-7677) or 1-706-356-3708.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS190

Series 77 Sizes 2 and 4

5/2 CrossMirror® Pressure Controlled Double Valve

Thank You!

You have purchased a premium quality ROSS® pneumatic valve. It is a control reliable pressure control 4-way double valve that is controlled by two separate pneumatic signals essentially providing AND gate control for the output ports. Both air pilot signals must be provided within approximately 500 milliseconds of each other to actuate the valve. If the valve is not actuated, not provided appropriate pneumatic signals within the discordance window, or if the valve actuates abnormally, inlet pressure will only be passed to port 2. Proper actuation shifts output pressure to port 4.

This valve is constructed with precision, stainless steel spools as the main valve elements, and is designed to offer added safety to the operation of many pneumatic pneumatically controlled machines.

IMPORTANT NOTE: This Valve is Not Designed for Controlling Clutch/Brake Mechanisms on Mechanical Power Presses.

With care in its installation and maintenance you can expect it to have a long and reliable service life. Before you go any further, please take a few minutes to look over the information in this folder, and save it for future reference.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

After installation is complete, refer to Valve Operation *on page 2 to ensure that the valve is functioning properly.*

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply due to a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (see *Valve Specifications, page 3),* but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may fail to operate.

Valve Outlet (Ports 2 and 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends. Port 2 is the normally open port (pressurized when the valve is de-actuated or when the redundant valve elements are not actuated within 500 milliseconds of each other), and port 4 is the normally closed port (pressurized only when both main valve elements have been actuated within 500 milliseconds of each other).

Valve Exhaust (Ports 3 and 5): Do not restrict air flow from the exhaust ports as this can adversely affect the operation of the valve. Any flow control requirements should be installed between the actuator and the valve (ports 2&4) at the cylinder and not in the valve exhaust ports.

Signal Ports (Ports S1 and S2): The valves supplying air to these ports should be 3-way normally closed valves and must have a Cv rating of not less than 0.3. The pilot valves must have an adequate supply to provide consistent pressure greater than or equal to the main valve supply in Port 1 (see Valve Specifications, page 3). Ensure that the lines supplying air to the Signal Ports are of equal length, and no less than 3/16" (5mm) inside diameter.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperature are given in the *Valve Specifications* on page 3. Exceeding the values shown can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe with tapered threads in the ports in the base, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228–G, etc.) do not use sealant.

Pressure Switch: If feedback is desired Ross offers a version of the valve with a pressure switch feedback device that can be used to provide feedback to other electrical controls for valve ready-to-run status.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE OPERATION

Normal Operation: After installation the valve is operated by pressurizing both pilot supply ports (S1 and S2) simultaneously. This causes both main valve elements to be actuated so that air from inlet port 1 flows to outlet port 4, but not to port 2. Air downstream of port 2 is exhausted through port 3.

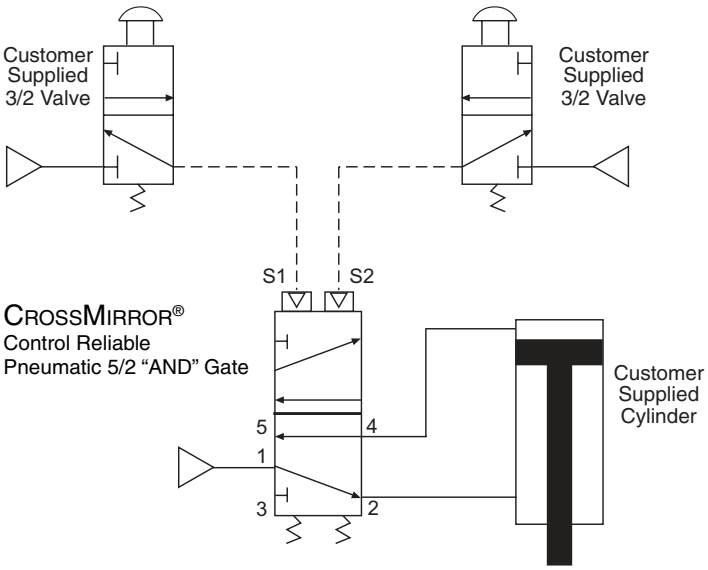
When the pilot supply ports are de-pressurized, both valve elements are de-actuated, and air then flows from inlet port 1 to outlet port 2, but no longer to outlet port 4. Air downstream of port 4 is exhausted through port 5.

Safety Function: If the two main valve elements are not actuated or de-actuated synchronously, within 500 milliseconds, the valve defaults so that outlet port 2 receives full inlet pressure, and outlet port 4 is exhausted through port 5. If this abnormal operation is the result of a temporary circumstance, the valve will be ready to resume normal operation as soon as both pilot signal ports have been de-pressurized and both main valve elements have returned to their normal "ready-to-run" position. Applying pressure to both signal ports simultaneously will resume normal operation.

If the cause of the abnormal operation is still present, the valve will either remain in the default position (pressure on port 2 and not port 4) or will again go into this position on the next actuation attempt. The source of the abnormality must be investigated and corrected before further operation.

Pressure Switch: Valves with model numbers ending in the number 1 have a pressure switch to provide user feedback when movement of the main valve elements was asynchronous.

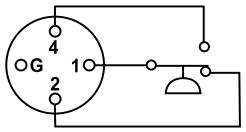
Typical 2-Hand-Anti-Tie-Down Application



Status Indicator (pressure switch)

Terminals 1 and 4 are connected when air pressure is present and the valve is "Ready-to-Run". If an abnormal operation has occured or pressure is removed from the valve inlet, terminals 1 and 2 are connected.

Note: DC voltage pressure switches do not have a ground terminal.



Pin 1: Common
Pin 2: Normally Closed
Pin G: Not used
Pin 4 : Normally Open

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that the double valve itself does not require air line lubrication.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with anti-wear or phosphate additives (e.g., zinc dithiophosphate), and diester oils; these substances can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed on page 3. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance by causing sluggish or erratic valve action which can result in the valve defaulting. A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve, use a solvent which will dry without leaving a residue. This is especially important for the spool and sleeve assembly. Do not use a chlorinated solvent or abrasive materials which can damage seals or metal parts. Do *not* scrape varnished surfaces.

To reassemble the spool and sleeve, put one drop of Anderol 735 (or equivalent lubricant) on each spool land. Insert the spool into the sleeve and rotate it several times to ensure even distribution of the lubricant. If the valve is used in a non- lubricated application, do not use a lubricant for reassembly which can dry out or leave a residue. Dry assembly of the spool and sleeve is preferable. Each spool and sleeve is a matched set, so care must be taken not to reverse the position of the spool in the sleeve.

Before inserting the spool-and-sleeve into the valve body, very lightly lubricate the O-rings with a lubricant such as those shown above. *Do not use Anderol; it causes the O-rings to deteriorate.,*

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Service kits are listed on page 3.

VALVE SPECIFICATIONS

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 40 to 100 psig (2.5 to 7.0 bar).

Pilot Pressure: Must be equal or greater than inlet pressure, but should not exceed maximum inlet pressure.

Pressure Switch Rating:
Max Current 4A, Max 250 volts AC.
Max Current 50 mA, Max 24 volts DC.

VALVE SERVICE

ROSS would be happy to service this specialized valve for you at its factory repair center (1-800-GET-ROSS).

For servicing the valve yourself, the needed service kits and components are described below.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are spools, gaskets and seals kits, and instructions for use.

Valve Body Gasket Kits. These kits are needed when valve bodies are disassembled for cleaning. They include all necessary gaskets, O-rings and other seals.

Base Service Kits. These kits contain the seals and other parts required to recondition the valve's base.

Pressure Switch Assembly Kits. These kits contain the parts necessary to recondition the pressure switch assembly.

Replacement Pressure Switches and Switch Connectors. Part numbers for these components are shown in the chart below.

Valve Size	Valve Model Number	Valve Body Seal and Gasket Kit	Valve Body Service Kit	Base Service Kit	Pressure Switch Assembly Service Kit	Pressure Switch	Pressure Switch Connector
2	7786A3400	2216K77	2218K77	1694K77	N/A	N/A	N/A
	7786A3401	2216K77	2218K77	1694K77	1696K77	AC - 518E30 DC - 798E30	522E30
4	7786A4400	2217K77	2219K77	1695K77	N/A	N/A	N/A
	7786A4401	2217K77	2219K77	1695K77	1696K77	AC - 518E30 DC - 798E30	522E30

If you need additional information, or have any questions about installing or servicing your valve, call ROSS *Technical Services*

in the U.S.A. at:

1-888-TEK-ROSS(835-7677) or 1-706-356-3708.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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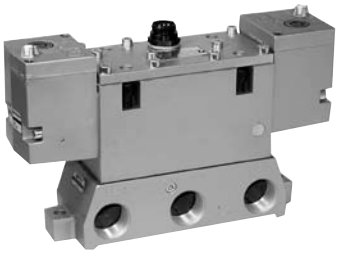
Series 80 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a stainless-steel spool-and-sleeve valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.



SAE 500

SAE 125

SAE 250

ROSS Series 80 valves and bases must be purchased separately.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Ports: Your valve is a multipurpose valve and may have any of its ports restricted and/or pressurized provided there is sufficient pilot pressure. Conventional port usage is identified below.

Valve Inlet (Port P): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports A & B): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports EA & EB): These ports may be restricted to control cylinder speed. To reduce exhaust noise use an efficient silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Pilot Supply:

Solenoid Control: Pressure for the pilot valves is supplied from the inlet port. Be sure that the external pilot supply port X in the base is plugged or pilot air will escape. If the valve must operate with an inlet pressure less than the required pilot pressure (see *Valve Specifications* on page 2), an external pilot supply must be provided. Connect to port X in the base.

Pressure Control: Connect the control line(s) to the ports provided in the base or manifold. See *Valve Specifications* on page 2 for required pressures.

Vacuum or Non-Air Service: Such applications require an external pilot supply for solenoid valves. Connect to port X in the base.

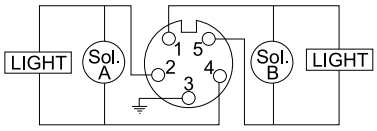
Electrical Supply: The voltage and hertz ratings of the valve solenoids are shown on the plate on the top of the valve. The electrical supply must correspond to these ratings, or solenoid life will be shortened.

Power is supplied via the 5-pin connector or conduit in the top of the valve. (See connector diagrams below.) If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop.

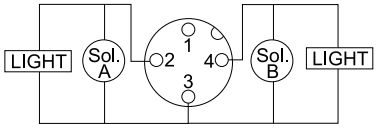
Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

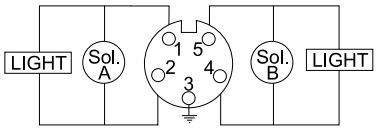
Ford Wired 5-pin mini-connector (all voltages)



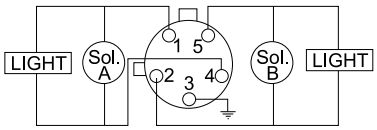
Ford Wired 4-pin mini-connector (24 vdc)



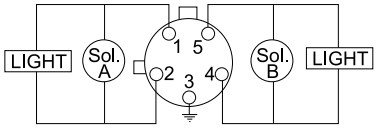
Chrysler Wired 5-pin mini-connector (all voltages)



Chrysler Wired 5-pin micro-connector (24 vdc)



Chrysler Wired 5-pin micro-connector (120 volts / 60 Hz))



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DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate.

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

To clean the valve use a solvent which will dry without leaving a residue. This is especially important for the spool-and-sleeve assembly. Do not use a chlorinated solvent orabrasive materials. The former damages seals and abrasives can do permanent harm to metal parts.

To reassemble the spool and sleeve put one drop of Anderol 735 (or equivalent lubricant) on each spool land. Insert the spool into the sleeve and rotate it several times to ensure even distribution of the lubricant.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

If the valve is used in a non-lubricated application, do not use a lubricant for reassembly which can dry out and leave a residue. Dry assembly of the spool and sleeve is preferable. Each spool and sleeve is a matched set, so care must be taken not to reverse the position of the spool in the sleeve.

Before inserting the spool-and-sleeve into the valve body, very lightly lubricate the O-rings with a compatible lubricant. *Do not use Anderol; it causes the O-rings to deteriorate.*

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Service kits for these valves are listed on page 3.

VALVE SPECIFICATIONS

Valve Sizes: Series 80 valves are made in three SAE sizes. The SAE size of your valve is indicated by the fourth digit from the end of the valve's model number:

Digit 3: SAE Series 125
Digit 4: SAE Series 250
Digit 6: SAE Series 500

Model 8076B4331, for example, is an SAE Series 250 valve.

Pressure Controlled

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: Vacuum to 150 psig (10 bar).

Pilot Pressure: At least 15 psig (1 bar).

Solenoid Pilot

Solenoids: Rated for continuous duty. 115 volts, 60 Hz.

Power Consumption:
SAE 125 and 250 models: 8 VA inrush, 6 VA holding.
SAE 500 models: 87 VA inrush, 30 VA holding.

Temperature Range:
Ambient: 40°F to 120°F (4°C to 50°C).
Media: 40°F to 175°F (4°C to 80°C).

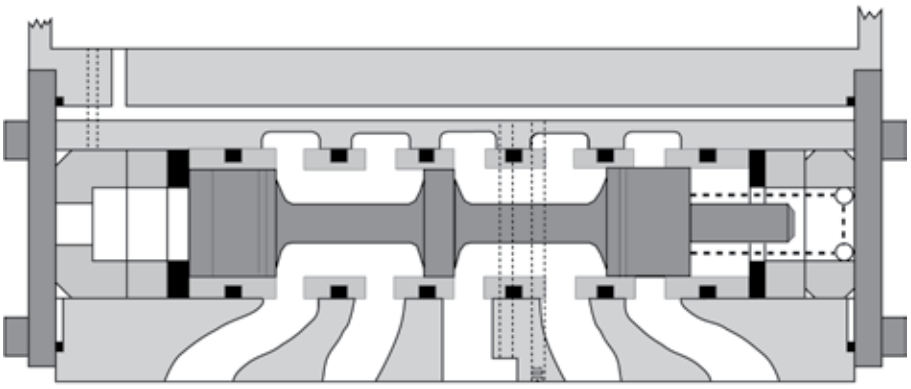
Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: Vacuum to 150 psig (10 bar)

Pilot Pressure: At least 15 psig (1 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Typical cross section of a ROSS Series 80 spool-&-sleeve valve body. Spring return model shown.



VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center (1-800-438-7677 inside the U.S. or 706-356-3708 outside the U.S.). However, if you choose to service this valve yourself, it is strongly recommended that you obtain a free service manual from your local ROSS distributor. Distributor information as well as downloadable service manuals are available at www.rosscontrols.com.

Listed below and in the chart at the right are the parts and service kits most likely to be needed if your valve requires service.

Valve Body Service Kits. These kits, listed in the chart at the right, contain all parts needed for a complete reconditioning of a valve body. Included are a spool-and-sleeve assembly, all required gaskets and seals, detent assemblies for valves using them, and instructions for use.

Solenoids. Replacement solenoids or solenoid coils can be ordered by the following part numbers:

SAE 125: **314B33** (Coil only)

SAE 250: **308K33** (Coil only)

SAE 500: **411B04** (Complete solenoid)

Specify the correct voltage and hertz when ordering.

Pilot Service. The following are available to service the pilot assemblies (2 each required for double solenoid valves):

SAE 125: Pilot service kit **1100K77.** Coil not included.

SAE 250: Complete pilot assembly **936C79.** Includes solenoid coil.

SAE 500: Pilot service kit **946K87.** Solenoid not included.

Valve-to-Base Gasket. If your valve is removed from its base for any reason, a new valve-to base gasket must be used to ensure a leak-free seal. (This gasket is already included in valve body service kits).

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

Valve Model Number	Valve Body Service Kit	Valve-to-Base Gasket
8076B3331	1244K77	637B11
8076B3332	1247K77	637B11
8076B3341	1244K77	637B11
8076B3342	1247K77	637B11
8076B3351	1244K77	637B11
8076B3352	1247K77	637B11
8076B4331	1245K77	677B11
8076B4332	1248K77	677B11
8076B4341	1245K77	677B11
8076B4342	1248K77	677B11
8076B4351	1245K77	677B11
8076B4352	1248K77	677B11
8076B6331	1246K77	352B11
8076B6332	1249K77	352B11
8076B6341	1246K77	352B11
8076B6342	1249K77	352B11
8076B6351	1246K77	352B11
8076B6352	1249K77	352B11
8077B3331	1250K77	637B11
8077B3332	1253K77	637B11
8077B3341	1250K77	637B11
8077B3342	1253K77	637B11
8077B3351	1250K77	637B11
8077B3352	1253K77	637B11
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8077B4341	1251K77	677B11
8077B4342	1254K77	677B11
8077B4351	1251K77	677B11
8077B4352	1254K77	677B11
8077B6331	1252K77	352B11
8077B6332	1255K77	352B11
8077B6341	1252K77	352B11
8077B6342	1255K77	352B11
8077B6351	1252K77	352B11
8077B6352	1255K77	352B11

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Series 84 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a single-spindle poppet valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.

ROSS Series 84 valves and bases must be purchased separately.

SAE 250 shown

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port P): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports A & B): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports EA & EB): Do not restrict exhaust air flow as this can adversely affect valve performance. However, to reduce noise you may use an efficient silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Pilot Supply:

Solenoid Control: Pressure for the pilot valves is supplied from the inlet port. Be sure that the external pilot supply port X in the base is plugged or pilot air will escape. If the valve must operate with an inlet pressure less than the required pilot pressure (see *Valve Specifications* on page 2), an external pilot supply must be provided. Connect to port X in the base.

Pressure Control: Connect the control line(s) to the ports provided in the valve. See *Valve Specifications* on page 2 for required pressures.

Non-Air Service: Such applications require an external pilot supply for solenoid valves. Connect to port X in the base.

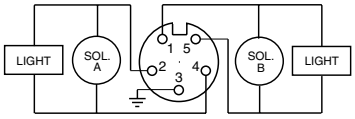
Electrical Supply: The voltage and hertz ratings of the valve solenoids are shown on the plate on the top of the valve. The electrical supply must correspond to these ratings, or solenoid life will be shortened.

Power is supplied via the 5-pin connector or conduit in the top of the valve. (See connector diagrams below.) If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop.

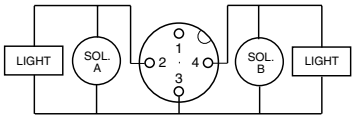
Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

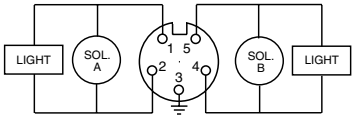
Ford Wired 5-pin mini-connector (all voltages)



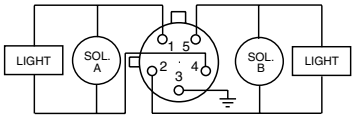
Ford Wired 4-pin micro-connector (24 vdc)



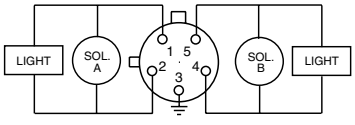
Chrysler Wired 5-pin mini-connector (all voltages)



Chrysler Wired 5-pin micro-connector (24 vdc)



Chrysler Wired 5-pin micro-connector (120 volts / 60 Hz)



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ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located as close to the valve as possible is strongly recommended. The filter bowl should be drained regularly, and if the filter's location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate: A lubricator should put atomized oil into the air line in direct proportion to the rate of air flow. Excessive air line lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute of air flow is adequate. (Note that your ROSS valve does not itself require air line lubrication.) See next column for a partial list of lubricants that are compatible with ROSS valves and are suitable for use in compressed air systems.

Cleaning Valve: If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance. Although ROSS poppet valves are very tolerant of dirty air, cleaning may sometimes be needed.

To clean the valve use any good commercial solvent or kerosene. Do *not* use a chlorinated solvent or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts.

Before reassembling the valve lubricate all sliding surfaces with a grease equivalent to Dow Corning BR–2.

Electrical Contacts: In the external electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components: After long usage the poppets may show signs of wear. The valve can be reconditioned with the use of ROSS service kits. See page 3 for information about such kits.

COMPATIBLE LUBRICANTS

Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and thereby cause the valve to malfunction. The best oils to use are those specifically compounded for air line lubricator service. These are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity. A few of the compatible lubricants on the market are listed below.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32
	Amoco Spindle Oil C
	Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22
	Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11
	Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

VALVE SPECIFICATIONS

Valve Sizes: Series 84 valves are made in three SAE sizes. The SAE size of your valve is indicated by the fourth digit from the end of the valve's model number:

Digit 3: SAE Series 125
Digit 4: SAE Series 250
Digit 6: SAE Series 500

Model 8476B4331, for example, is an SAE Series 250 valve.

Pressure Controlled

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 30 to 150 psig (2 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure.

Solenoid Pilot

Solenoids: Rated for continuous duty. 115 volts, 60 Hz.

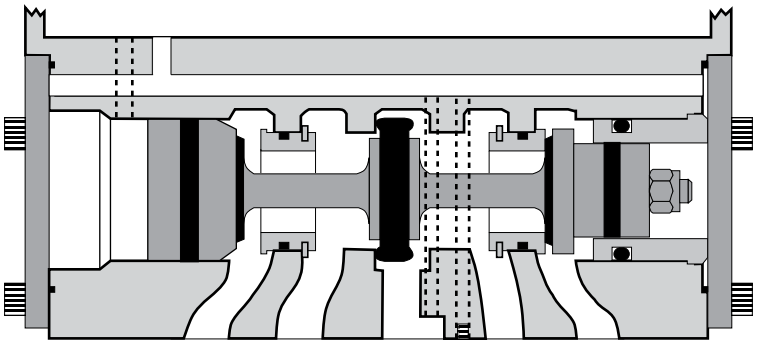
Power Consumption:
SAE 125 and 250 models: 8 VA inrush, 6 VA holding.
SAE 500 models: 87 VA inrush, 30 VA holding.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 30 to 150 psig (2 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure.



Typical cross section of a ROSS Series 84 poppet valve body. Internal pressure return model shown.

VALVE SERVICE

ROSS would be happy to service this specialized valve for you at its factory repair center (1-800-GET-ROSS). However, if you choose to service this valve yourself, it is strongly recommended that you obtain its free service manual from ROSS in the U.S.A. at 1-800-GET-ROSS.

Listed below and in the chart at the right are the parts and service kits most likely to be needed if your valve requires service.

Valve Body Service Kits. These kits, listed in the chart at the right, contain all parts needed for a complete reconditioning of a valve body. Included are a spindle, all poppets and spacers, all required gaskets and seals, detent assemblies for valves using them, and instructions for use.

Solenoids. Replacement solenoids or solenoid coils can be ordered by the following part numbers:

SAE 125: **314B33** (Coil only)

SAE 250: **308K33** (Coil only)

SAE 500: **411B04** (Complete solenoid)

Specify the correct voltage and hertz when ordering.

Pilot Service. The following are available to service the pilot assemblies:

SAE 125: Pilot service kit **1100K77.** Coil not included.

SAE 250: Complete pilot assembly **936C79.** Includes solenoid coil.

SAE 500: Pilot service kit **145H77.** Solenoid not included.

Valve-to-Base Gasket. If your valve is removed from its base for any reason, a new valve-to base gasket must be used to ensure a leak-free seal. (This gasket is already included in valve body service kits.)

Valve Model Number	Valve Body Service Kit	Gasket & Seal	Valve-to-Base Gasket
8476B3331	990K77	1031K77	637B11
8476B3332	991K77	1032K77	637B11
8476B3341	990K77	1031K77	637B11
8476B3342	991K77	1032K77	637B11
8476B3351	990K77	1031K77	637B11
8476B3352	991K77	1032K77	637B11
8476B4331	785K77	1029K77	677B11
8476B4332	786K77	1030K77	677B11
8476B4341	785K77	1029K77	677B11
8476B4342	786K77	1030K77	677B11
8476B4351	785K77	1029K77	677B11
8476B4352	786K77	1030K77	677B11
8476B6331	992K77	1033K77	352B11
8476B6332	993K77	1034K77	352B11
8476B6341	992K77	1033K77	352B11
8476B6342	993K77	1034K77	352B11
8476B6351	992K77	1033K77	352B11
8476B6352	993K77	1034K77	352B11

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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DM[1] Series E Control Reliable
Double Valves with Dynamic Monitoring Size 2

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a high quality DM[1] Series E Control Reliable double valve with Dynamic Monitoring for Category 3 applications. With care in its installation and maintenance you can expect it to have a long and economical service life. Before you install this valve, read the information in this folder completely, and save it for future reference.

IMPORTANT APPLICATION NOTE: Because its characteristics are for Category 3 applications this valve is not for use in press clutch/brake applications. ROSS produces the DM[2]® Series D and a number of other double valve configurations with flow, exhaust and lockout characteristics for press clutch/brake applications.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing this valve in a new or existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (*see Standard Specifications, page 3*), but must also provide an adequate flow of air on demand.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict the air flow from the exhaust port as this can adversely affect the operation of the valve. The valves are factory equipped with a properly sized silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, with minimum back pressure.

Electrical Supply: DM[1] Series E valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and frequency ratings of the solenoids; otherwise the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Standard Specifications* on page 3 for current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Standard Specifications* on page 3. Exceeding these values can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe in ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228-I, etc.) do not use sealant.

Test: After installation or repair and prior to normal use, the valve must be tested for proper functioning. Observe normal equipment operation safety precautions such as lockout procedures during these tests to avoid personal injury or damage to equipment.

DM[1] Series E Testing Procedure: *NOTE: After DM[1] Series E valves do "lockout" they may not stay in the "lockout condition" as do the DM[2]® Series E and DM[2]® Series C valves that remember abnormal function. The valves that include memory functions, once "locked-out", must be reset by a dedicated reset function in order to be operated again. DM[1] Series E valves will operate again as soon as the fault condition has cleared. Removing electrical power to both pilot solenoids may clear the lockout condition if the situation that caused the valve internals to not operate simultaneously is no longer in effect. This is referred to as "automatic reset." This may result in momentary lockout going undetected during machine operation without the use of the optional status indicator.*

A) Electrically energize both pilot solenoids simultaneously. The valve should supply pressure from inlet port (1) to outlet port (2). There should be no flow to the exhaust port (3) at this time.
B) De-energize one of the pilot solenoids. The valve should go into a lockout condition such that any downstream pressure in the outlet port (2) will be exhausted to atmosphere through exhaust port (3). There should also be a small, but audible, flow of air out the exhaust port (3) as long as the valve remains in the lockout condition.
C) Re-energize the pilot solenoid that was de-energized in step B above. The valve must remain in the lockout condition.
D) De-energize both pilot solenoids and the DM[1] Series E valve should return to the "ready-to-run" condition. There should be no pressure present at outlet port (2) and there should no longer be any audible flow of air to exhaust port (3).
E) Energize both pilots simultaneously again. As in step A above, the valve should supply pressure from inlet port (1) to outlet port (2), there should be no flow to the exhaust port (3).
F) De-energize the other pilot solenoid. As in step B above, the valve should again go into a lockout condition.
G) Re-energize the pilot solenoid that was de-energized in step F above. The valve must remain in the lockout condition.
H) De-energize both pilot solenoids and the DM[1] Series E valve should again return to the "ready-to-run" condition as in step D above.

Fault Indication: The status indicator can be used to signal the machine controls that a lockout has occurred. The status indicator utilizes a pressure switch. The pressure switch has 4 electrical contacts (**NOTE:** Contact 4 is a ground). During normal operation the pressure switch is pressurized. A lockout condition depressurizes the switch until the valve is ready to run (after power has been removed from both pilot solenoids). Contacts 1 and 2 are closed when the switch is depressurized (normally closed) and contacts 1 and 3 are closed when an adequate pressure signal is applied to the switch (normally open).

VALVE OPERATION

NOTE: DM[1] Series E *valves do not "lockout" like the* DM[2®] Series E and DM[2®] Series C *valves that remember abnormal function. The valves that include memory functions, once "locked-out", must be reset by a dedicated reset function in order to be operated again.* DM[1] Series E *valves are ready to operate again as soon as the abnormal condition has cleared. Removing electrical power to both pilot solenoids may clear the abnormal condition if the situation that caused the valve internals to not operate simultaneously is no longer in effect. This is referred to as "automatic reset." This may result in abnormal function going undetected during machine operation without the use of the optional status indicator.*

The overall function of the DM[1] Series E double valve is that of a 3-way, 2-position (3/2) normally closed single solenoid valve. When in the normal "at-rest" condition, the valve inlet port (1) is closed and the outlet port (2) is open to the exhaust port (3). Normal actuation of the valve opens the valve inlet port (1) to the outlet port (2) and closes the exhaust port (3). De-actuation returns the valve to the normal "at-rest" condition. However, being a double valve, there are two solenoid pilots and two sets of valve elements for redundancy. That being the case, both solenoids must be energized virtually simultaneously in order for the valve to actuate normally to supply air from inlet to outlet. Likewise, both solenoids de-energize simultaneously in order to de-actuate and return the valve to its normal at rest condition, thus shutting off the inlet and dumping downstream air to exhaust.

If one of the valve elements does not shift fully within a preset discordance time, the valve will go into a condition such that any downstream pressure in the outlet port (2) will be exhausted to atmosphere through exhaust port (3). There should also be a small, but audible, flow of air out the exhaust port (3) as long as the valve remains in this condition.

De-energizing the main pilot solenoids may clear the abnormal condition if the situation that caused the valve elements to not operate simultaneously is no longer in effect. This is referred to as "automatic reset." Once the abnormal condition is cleared the valve is "ready-to-run" again. If you equip your valve with the optional status indicator, a abnormal condition will be indicated by a change in state of the status indicator pressure switch.

If de-energizing the pilot solenoids and/or removing supply air pressure do not cause the abnormal condition to clear, the circuit and valve must be exhausted and may need to be serviced.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. *Note that the double valve itself does not require air line lubrication.*

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate) and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. It is recommended that the inlet air to the valve should be filtered. Disassembly of the valve for cleaning and repair must be done by qualified persons. The testing procedures must be done for valves that have been disassembled and repaired. Lubrication recommended is Owens Corning BR2 Plus grease. It is applied only to the piston seals and bores. Do not lubricate the poppet seals.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32
	Amoco Spindle Oil C
	Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22
	Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11
	Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

Repair kits are available for internal components. Valves can be returned to Ross Controls for repair.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out before beginning any disassembly operation. Service kits are listed on page 3.

STANDARD SPECIFICATIONS

Solenoids: According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Connector socket according to DIN 43650 Form A. Two solenoids, rated for continuous duty.

Standard Voltages: 110 volts AC, 50/60 Hz; 220 volts AC 50/60 Hz; 12 volts DC, 24 volts DC.

Pilot Solenoid Power Consumption (each solenoid): 6.0 watts on DC and 15.8 VA inrush and 10.4 VA holding on AC.

Ambient Temperature: 15° to 120°F (-10° to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered (5 micron recommended), lubricated or unlubricated air (mineral oils according to DIN 51519, viscosity classes 32-46).

Inlet Pressure: 30 to 116 psig (2 to 8 bar).

Pressure Switch (Status Indicator) Rating: Contacts - 5 amps at 250 volts AC, or 5 amps at 30 volts DC.

Application: Category 3 applications and not press clutch/brake applications.

Electrical Connectors

Wired connectors have a 2-meter (6 1/2 ft) cord with three 18-gauge conductors. Cord is available in either 6-mm or 10-mm diameter and with or without indicator light. Specify solenoid voltage for lighted connectors.

	Without Light	With Light 24 volts DC	With Light 110 volts AC
Wired with 6-mm cord	**721K77**	**720K77-W**	**720K77-Z**
Wired with 10-mm cord	**371K77**	**383K77-W**	**383K77-Z**
For threaded conduit	**723K77**	**724K77-W**	**724K77-Z**
For use with drop cord (cord not included)	**937K87**	**936K87-W**	**936K87-Z**

For additional wiring kit accessories, please see Form NPS011 available at www.rosscontrols.com.

VALVE SERVICE

ROSS would be happy to service this specialized double valve for you at its factory repair center. Call your local distributor or, (in the U.S.) 1-800-GET-ROSS (+706-356-3708 outside the U.S.) for information. If you service the valve yourself, be sure to turn off electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out all power sources before beginning any disassembly operation. Listed below are kits for servicing DM[1] Series E double valves, as well as replacement solenoid information.

CAUTION: *Before operating the DM[1] Series E double valve, be sure to complete the Test Procedure, on page 1, upon installation and after any maintenance is performed on the valve. Failure to do so could result in personal injury or equipment damage.*

Valve Body Service Kit. This kit is used for complete reconditioning of a valve body and includes poppets, spindles, gaskets, seals, and instructions.

Order kit number - **2277K77**

Gasket and Seal Kit. This kit is used when valve bodies are disassembled for cleaning and includes all the necessary gaskets, O-rings, and other seals.

Order kit number - **2278K77**

Status Indicator Assembly Service Kit. This kit is used for complete reconditioning of the status indicator assembly. Pressure switch and connector sold separately - see at right.

Order kit number - **2151H77**

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location or in the U.S.A. at:
1-888-TEK-ROSS or 1-706-356-3708.

Replacement Pressure Switch and Connector. This kit is used to replace the pressure switch and electrical connector of the status indicator assembly.

Order kit number -**1104A30**

Solenoid Coils. Order replacement solenoid coils by the following part numbers:

- **306K33165** for 24 volts DC
- **306K33165** for 110 volts AC

Complete Solenoid Pilot and Solenoid Reset Assemblies. Order replacement solenoid assemblies by the following part numbers:

- **851C79165** for 24 volts DC
- **851C79166** for 110 volts AC

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
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ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

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Form SS302

DM²® Series C

Control Reliable Double Valves Sizes 4, 8, 12 & 30

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a high quality DM²® Series C double valve with dynamic monitoring and inherent lockout capability for category 3 and 4 applications (except press clutch/brake applications). The valve is designed for base mounting for ease of installation and maintenance. With care in its installation and maintenance you can expect it to have a long and economical service life. Before you install this valve, read the information in this folder completely, and save it for future reference.

NOTE: This valve is expressly not intended for use in press clutch/brake applications. ROSS produces the DM²® Series D and a number of other double valve configurations specifically for use with press clutch/brake applications.

Size 4 illustrated

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Application: DM²® Series C double valves are intended for use in category 3 & 4 applications except press clutch/brake applications.

Air Lines: Before installing this valve in a new or existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (*see Standard Specifications, page 3*), but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may fail to operate.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict the air flow from the exhaust port as this can adversely affect the operation of the valve. The valves are factory equipped with a properly sized silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Reset Solenoid: DM²® Series C double valves are supplied with a 3/2 normally closed solenoid valve for reset purposes. Electrical reset signal must be momentary and of correct voltage.

Electrical Supply: DM²® Series C double valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Standard Specifications* on page 3 for current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Standard Specifications* on page 3. Exceeding these values can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe in base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228-G, etc.) do not use sealant. After installing pipe into the base ports, use compressed air to blow any debris out of the piping, then install the valve onto the base.

Test: After installation or repair and prior to normal use, the internal lockout feature of the DM²® Series C double valve must be tested for proper functioning. Observe normal equipment operation safety precautions during these tests to avoid personal injury or damage to equipment.

NOTE: Reset may need to be performed prior to beginning the test procedure. Also, the valve is designed such that both pilot solenoids must be de-energized prior to reset, and must remain de-energized until after the reset signal is removed. Otherwise, the valve will not reset.

A) Electrically energize both pilot solenoids simultaneously, then de-energize one pilot solenoid. This should result in a valve lockout and prevent the valve from operating. **B)** Energize both solenoids and the valve should remain in the lockout condition. **C)** De-energize both pilot solenoids and reset the valve. **D)** Electrically energize both pilot solenoids simultaneously again. De-energize the other pilot solenoid this time. Again, this should result in a lockout. **E)** Energize both pilot solenoids. The valve should remain in a lockout condition. **F)** De-energize both pilot solenoids and then reset the valve.

After satisfying these tests, energizing both pilot solenoids simultaneously should result in normal operation.

Fault Indication: The built-in status indicator can be used to signal the machine controls that a fault has occurred. The status indicator utilizes a pressure switch. The pressure switch has 4 electrical contacts. During normal operation the pressure switch is pressurized. A lockout condition depressurizes the switch until the valve is reset. Contacts 1 and 2 are closed when the switch is depressurized (normally closed) and contacts 1 and 3 are closed when an adequate pressure signal is applied to the switch (normally open).

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DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE OPERATION

On first operation, or after repair, the pilot valve supply circuit and inherent monitoring elements may need to be reset. This reset is accomplished by applying a momentary air signal to the RESET port or by energizing the optional reset solenoid momentarily on the valve. After reset, the valve will then be ready for operation.

The air supply to each pilot valve is controlled by the position of the inlet poppets. In the ready-for-operation position these poppets are held on their seats and maintain pilot air flow. During shifting of the valve elements the poppets move off seat and momentarily allow pilot air to escape to exhaust. If either valve element fails to operate correctly, the pilot supply to the other valve element will remain connected to exhaust causing the valve to lockout.

The internal monitoring system will lock out the valve if the time difference between both elements shifting fully is longer than approximately 125 milliseconds. This timing is preset by restricting-orifices and chambers in the pilot air circuit.

The main airflow from port 1 to port 2 is via crossflow passages between both main valves, so that both valve elements must be fully shifted in order for port 2 to be pressurized.

If the valve locks out, further operation is prevented until the valve has been reset. Electrical signals to the solenoids must be "off" to allow the valve to be reset.

The DM$^{2®}$ Series C valve is completely self-contained and does not need an external monitoring system.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. *Note that the double valve itself does not require air line lubrication.*

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate) and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To clean the valve, use any good commercial solvent. Do *not* scrape varnished surfaces. Also, do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as Dow Corning BR 2 Plus.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, exhaust the air in the system, and lockout before beginning any disassembly operation. Service kits are listed on page 3.

STANDARD SPECIFICATIONS

Solenoids: According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Connector socket according to DIN 43650 Form A. Two solenoids, rated for continuous duty (three with solenoid reset option).

Standard Voltages: 110 volts, 50/60 Hz; 220 volts 50/60 Hz; 24 volts DC.

Pilot Solenoids Power Consumption (each solenoid):

Sizes 4, 12, & 30: 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

Size 8: 15 watts on DC; 36 VA inrush and 24.6 VA holding on AC.

Reset Solenoid Power Consumption: 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

Ambient Temperature: 15° to 120°F (-10° to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered (5 micron recommended), lubricated or unlubricated air. (mineral oils according to DIN 51519, viscosity classes 32-46).

Inlet Pressure: 30 to 115 psig (2 to 8 bar).

Reset Pressure: For remote reset option – equal to inlet pressure.

Pressure Switch (Status Indicator) Rating: Contacts - 5 amps at 250 volts AC, or 5 amps at 30 volts DC.

Application: Category 3 & 4 applications except press clutch/brake.

Solenoid Reset: Units with solenoid reset include a 3/2 solenoid valve. Energize this solenoid momentarily to reset valve after lock-out condition occurs. ***NOTE:*** *The valve is designed such that both pilot solenoids must be de-energized prior to reset, and must remain de-energized until after the reset signal is removed. Otherwise, the valve will not reset.*

Electrical Connectors

Wired connectors have a 2-meter (6½ ft) cord with three 18-gauge conductors. Cord is available in either 6-mm or 10-mm diameter and with or without indicator light. Specify solenoid voltage for lighted connectors.

	Without Light	With Light
Wired with 6-mm cord	**721K77**	**720K77**
Wired with 10-mm cord	**371K77**	**383K77**
For threaded conduit	**723K77**	**724K77**
For use with drop cord (cord not included)	**937K87**	**936K87**

For additional wiring kit accessories, please see Form NPS011 available at www.rosscontrols.com.

VALVE SERVICE

ROSS would be happy to service this specialized double valve for you at its factory repair center. Call your local distributor or, (in the U.S.) 1-800-GET-ROSS (+706-356-3708 outside the U.S.) for information. If you service the valve yourself, be sure to turn off electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out all power sources before beginning any disassembly operation. Listed below are kits for servicing DM$^{2®}$ Series C double valves, as well as replacement solenoid information.

CAUTION: *Before operating the DM$^{2®}$ Series C double valve, be sure to complete the test procedure (TEST), on page 1, upon installation and after any maintenance is performed on the valve. Failure to do so could result in personal injury or equipment damage.*

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindles, gaskets, seals, and instructions for use.

Size 4.....**2102K77**
Size 8.....**2103K77**
Size 12.....**2104K77**
Size 30.....**2105K77**

Status Indicator Assembly Service Kit. This kit includes all parts needed for complete reconditioning of the status indicator assembly. Pressure switch and connector sold separately - see below.

All Sizes.....**2151H77**

Replacement Pressure Switch. This kit includes a replacement pressure switch and electrical connector for the status indicator assembly.

All Sizes.....**1104A30**

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at: **1-888-TEK-ROSS** or 1-706-356-3708.

Solenoid Coils. Order replacement solenoid coils by the following part numbers. Specify voltage and hertz when ordering.

	Pilot solenoids	Reset solenoid
Size 4, 12, 30	**306K33**	**306K33**
Size 8	**360K33**	**306K33**

Complete Solenoid Pilot Assemblies. Available for sizes 4 and 8, these assemblies consist of new pilot valve mechanisms and a new solenoid coil, ready to bolt in position on the valve. Specify voltage and hertz when ordering.

	Pilot solenoids	Reset solenoid
Size 4	**1403H79**	**851C79**
Size 8	**1404H79**	**851C79**
Sizes 12 & 30	**1391K79**	**851C79**

Pilot Booster Service Kits. Available for sizes 12 and 30, these kits contain all parts needed for complete reconditioning of a pilot booster. Included are poppets, gaskets, seals, and instructions for use.

Size 12 & 30.....**2106K77**

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and manual **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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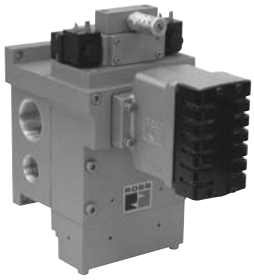
DM²® Series D
Double Valves Sizes 4, 8, 12, & 30

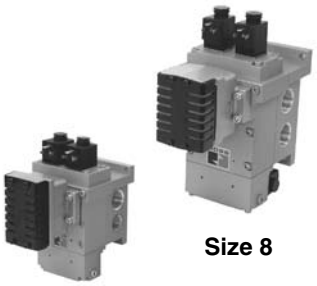
Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a high quality *DM²®* Series D double valve with dynamic monitoring and inherent lockout capability. The valve is designed for base mounting for ease of installation and maintenance. With care in its installation and maintenance you can expect it to have a long and economical service life.

Before you install this valve, read the information in this folder completely, and save it for future reference.



Size 12 & 30



Size 8

Size 4

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing this valve in a new or existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (*see Standard Specifications, page 3*), but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may fail to operate.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict the air flow from the exhaust port as this can adversely affect the operation of the valve. The valves are factory equipped with a properly sized silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Reset Port (RESET): If your valve is not equipped with a reset solenoid on the valve, then the RESET port should be supplied, externally, from a 3/2 normally closed valve. The lines must be of adequate size and be free of crimps and sharp bends. Reset signals must be momentary.

Electrical Supply: DM²® Series D double valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Standard Specifications* on page 3 for inrush current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Standard Specifications* on page 3. Exceeding these values can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe in base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228-G, etc.) do not use sealant. After installing pipe into the base ports, use compressed air to blow any debris out of the piping, then install the valve onto the base.

Test: After installation or repair and prior to normal use, the internal lockout feature of the DM²® Series D valve must be tested for proper functioning. Observe normal press operation safety precautions during these tests to avoid personal injury or damage to equipment. ***Note:*** *Reset may need to be performed prior to beginning the test procedure. Also, both pilot solenoids must be de-energized prior to reset and must remain de-energized until after the reset signal is removed.*

A) Electrically energize both pilot solenoids simultaneously, then de-energize one pilot solenoid. This should result in a valve lockout and prevent the valve from operating. **B)** Energize both solenoids and the valve should remain in the lockout condition. **C)** De-energize both pilot solenoids and reset the valve. **D)** Electrically energize both pilot solenoids simultaneously again. De-energize the other pilot solenoid this time. Again, this should result in a lockout. **E)** Energize both pilot solenoids. The valve should remain in a lockout condition. **F)** De-energize both pilot solenoids and then reset the valve.

After satisfying these tests, energizing both pilot solenoids simultaneously should result in normal operation.

Fault Indication: If fault indication is desired, ROSS offers a status indicator option that can be used to signal the press controls that a fault has occurred. The status indicator utilizes a pressure switch. The pressure switch has 4 electrical contacts. During normal operation the pressure switch is pressurized. A lockout condition depressurizes the switch until the valve is reset. Contacts 1 and 2 are closed when the switch is depressurized (normally closed) and contacts 1 and 3 are closed when an adequate pressure signal is applied to the switch (normally open).

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ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE OPERATION

On first operation, or after repair, the pilot valve supply circuit and inherent monitoring elements may need to be reset. This reset is accomplished by applying a momentary air signal to the RESET port or by energizing the optional reset solenoid momentarily on the valve. After reset, the valve will then be ready for operation.

The air supply to each pilot valve is controlled by the position of the inlet poppets. In the ready-for-operation position these poppets are held on their seats and maintain pilot air flow. During shifting of the valve elements the poppets move off seat and momentarily allow pilot air to escape to exhaust. If either valve element fails to operate correctly, the pilot supply to the other valve element will remain connected to exhaust causing the valve to lock-out.

The internal monitoring system will lock out the valve if the time difference between both elements shifting fully is longer than approximately 125 milliseconds. This timing is preset by restricting-orifices and chambers in the pilot air circuit.

The main airflow from port 1 to port 2 is via crossflow passages between both main valves, so that both valve elements must be fully shifted in order for port 2 to be pressurized.

If the valve locks out, further operation is prevented until the valve has been reset. Electrical signals to the solenoids must be "off" to allow the valve to be reset.

The DM$^{2®}$ Series D double valve is completely self-contained and does not need an external monitoring system.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. *Note that the double valve itself does not require air line lubrication.*

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate) and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To clean the valve, use any good commercial solvent. Do *not* scrape varnished surfaces. Also, do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as Dow Corning BR 2 Plus.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out before beginning any disassembly operation. Service kits are listed on page 3.

STANDARD SPECIFICATIONS

Solenoids: According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Connector socket according to DIN 43650 Form A. Two solenoids, rated for continuous duty (three with solenoid reset option).

Standard Voltages: 110 volts, 50/60 Hz; 220 volts 50/60 Hz; 24 volts DC.

Pilot Solenoids Power Consumption (each solenoid):

Sizes 4, 12, & 30: 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

Size 8: 15 watts on DC; 36 VA inrush and 24.6 VA holding on AC.

Reset Solenoid Power Consumption: 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

Ambient Temperature: 15° to 120°F (-10° to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered (5 micron recommended), lubricated or unlubricated air. (mineral oils according to DIN 51519, viscosity classes 32-46).

Inlet Pressure: 30 to 115 psig (2 to 8 bar).

Reset Pressure: For remote reset option – equal to inlet pressure.

Pressure Switch (Status Indicator) Rating: Contacts - 5 amps at 250 volts AC, or 5 amps at 30 volts DC.

Solenoid Reset: Units with solenoid reset include a 3/2 solenoid valve. Energize this solenoid momentarily to reset monitor after lock-out condition occurs.

NOTE: Main solenoids must be off when performing reset procedure.

Remote Reset: Remote signal to be supplied by customer's 3/2 valve (connect remote signal line to remote RESET port in valve). Apply signal momentarily to reset valve after fault condition occurs.

NOTE: *Main solenoids must be off when performing reset procedure.*

Electrical Connectors

Wired connectors have a 2-meter (6 1/2 ft) cord with three 18-gauge conductors. Cord is available in either 6-mm or 10-mm diameter and with or without indicator light. Specify solenoid voltage for lighted connectors.

	Without Light	With Light
Wired with 6-mm cord	**721K77**	**720K77**
Wired with 10-mm cord	**371K77**	**383K77**
For threaded conduit	**723K77**	**724K77**
For use with drop cord (cord not included)	**937K87**	**936K87**

VALVE SERVICE

ROSS would be happy to service this specialized double valve for you at its factory repair center. Call your local distributor or, (in the U.S.) 1-800-GET-ROSS (+706-356-3708 outside the U.S.) for information. If you service the valve yourself, be sure to turn off electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out all power sources before beginning any disassembly operation. Listed below are kits for servicing DM^{2}® Series D double valves, as well as replacement solenoid information.

CAUTION: *Before operating the DM^{2}® Series D double valve, be sure to complete the test procedure (TEST), on page 1, upon installation and after any maintenance is performed on the valve. Failure to do so could result in personal injury or equipment damage.*

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindles, gaskets, seals, and instructions for use.

Size 4.....**2102K77**
Size 8.....**2103K77**
Size 12.....**2104K77**
Size 30.....**2105K77**

Status Indicator Assembly Service Kit. This kit includes all parts needed for complete reconditioning of the status indicator assembly. Pressure switch and connector sold separately - see below.

All Sizes.....**2151H77**

Replacement Pressure Switch. This kit includes a replacement pressure switch and electrical connector for the status indicator assembly.

All Sizes.....**1104A30**

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:
1-888-TEK-ROSS or 1-706-356-3708.

Solenoid Coils. Order replacement solenoid coils by the following part numbers. Specify voltage and hertz when ordering.

	Pilot solenoids	Reset solenoid
Size 4, 12, 30	**306K33**	**306K33**
Size 8	**360K33**	**306K33**

Complete Solenoid Pilot Assemblies. Available for sizes 4 and 8, these assemblies consist of new pilot valve mechanisms and a new solenoid coil, ready to bolt in position on the valve. Specify voltage and hertz when ordering.

	Pilot solenoids	Reset solenoid
Size 4	**1403H79**	**851C79**
Size 8	**1404H79**	**851C79**
Sizes 12 & 30	**1391K79**	**851C79**

Pilot Booster Service Kits. Available for sizes 12 and 30, these kits contain all parts needed for complete reconditioning of a pilot booster. Included are poppets, gaskets, seals, and instructions for use.

Size 12 & 30.....**2106K77**

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS293

DM²® Series E Control Reliable

Double Valves with Dynamic Monitoring & Memory Size 2

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a high quality DM²® Series E Control Reliable double valve with Dynamic Monitoring and Memory for Category 4 applications, except press clutch/brake applications. With care in its installation and maintenance you can expect it to have a long and economical service life. Before you install this valve, read the information in this folder completely, and save it for future reference.

IMPORTANT APPLICATION NOTE: Because of its air flow & exhausting characteristics, this valve is not for use in press clutch/brake applications. ROSS produces the Series DM²® Series D and a number of other double valve configurations with flow & exhaust characteristics for press clutch/brake applications.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing this valve in a new or existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (*see Standard Specifications, page 3*), but must also provide an adequate flow of air on demand.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict the air flow from the exhaust port as this can adversely affect the operation of the valve. The valves are factory equipped with a properly sized silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, with minimum back pressure.

Reset Solenoid: DM²® Series E valves are supplied with a 3/2 normally closed solenoid valve for reset purposes. Electrical reset signal must be momentary and of correct voltage.

Electrical Supply: DM²® Series E valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and frequency ratings of the solenoids; otherwise the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Standard Specifications* on page 3 for current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Standard Specifications* on page 3. Exceeding these values can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe in ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228-I, etc.) do not use sealant.

Test: After installation or repair and prior to normal use, the valve must be tested for proper functioning. Observe normal equipment operation safety precautions such as lockout procedures during these tests to avoid personal injury or damage to equipment.

DM²® Series E Test Procedure:

NOTE: DM²® Series E valves include a memory function, and once "locked-out", must be reset by a dedicated reset function in order to be operated further. Therefore, it may be necessary to perform a reset on the valve prior to beginning the test procedure below. In order to reset the valve, make sure that supply pressure is present and both pilot solenoids are de-energized, then momentarily energize the reset solenoid for at least 200 milliseconds.

A) Electrically energize both pilot solenoids simultaneously. The valve should supply pressure from inlet port (1) to outlet port (2). There should be no flow to the exhaust port (3) at this time.

B) De-energize one of the pilot solenoids. The valve should go into a lockout condition such that any downstream pressure in the outlet port (2) will be exhausted to atmosphere through exhaust port (3). There should also be a small, but audible, flow of air out the exhaust port (3) as long as the valve remains in the lockout condition.

C) Re-energize the pilot solenoid that was de-energized in step B above. The valve must remain in the lockout condition.

D) De-energize both pilot solenoids. The valve must remain in the lockout condition.

E) Momentarily energize the reset solenoid (at least 200 milliseconds) to reset the valve. The valve should return to the "ready-to-run" condition. There should be no pressure present at outlet port (2) and there should no longer be any audible flow of air to exhaust port (3).

F) Energize both pilots simultaneously again. As in step A above, the valve should supply pressure from inlet port (1) to outlet port (2). There should be no flow to the exhaust port (3).

G) De-energize the other pilot solenoid. As in step B above, the valve should again go into a lockout condition.

H) Re-energize the pilot solenoid that was de-energized in step G above. The valve must remain in the lockout condition.

I) De-energize both pilot solenoids. The valve must remain in the lockout condition.

J) Momentarily energize the reset solenoid again (at least 200 milliseconds) to reset the valve. The valve should return to the "ready-to-run" condition as in step E above.

DM²® Series E Reset Function: *Both pilots must be de-energized during the reset function. A momentary delay is required to complete the reset function after the reset solenoid is energized.*

Lockout Indication: The built-in status indicator can be used to signal the machine controls that a lockout has occurred. The status indicator utilizes a pressure switch. The pressure switch has 4 electrical contacts. (**NOTE:** Contact 4 is a ground.) During normal operation the pressure switch is pressurized. A lockout condition depressurizes the switch until the valve is "ready to run" after a reset function has been performed . Contacts 1 and 2 are closed when the switch is depressurized (normally closed) and contacts 1 and 3 are closed when an adequate pressure signal is applied to the switch (normally open).

VALVE OPERATION

NOTE: *DM²® Series E valves include a memory function, and once "locked-out", must be reset by a dedicated reset function in order to operate further. The DM²® Series E valve cannot be reset simply by removing electrical power from both pilot solenoids and/or turning off supply air pressure. Therefore, it may be necessary to perform a reset on the valve prior to normal operation. In order to reset the valve, make sure that supply pressure is present and both pilot solenoids are de-energized, and then momentarily energize the reset solenoid for at least 200 milliseconds.*

The overall function of the DM²® Series E valve is that of a 3-way, 2-position (3/2) normally closed solenoid valve. When in the normal at-rest condition, the valve inlet port (1) is closed and the outlet port (2) is open to the exhaust port (3). Normal actuation of the valve opens the valve inlet port (1) to the outlet port (2) and closes the exhaust port (3). De-actuation returns the valve to the normal at-rest condition. However, being a double valve, there are two solenoid pilots and two sets of valve elements for redundancy. That being the case, both solenoids must be energized simultaneously in order for the valve to actuate normally to supply air from inlet to outlet. Likewise, both solenoids should be de-energized simultaneously in order to de-actuate and return the valve to its normal at rest condition, thus shutting off the inlet and dumping downstream air to exhaust.

If one of the valve elements does not shift fully and in sync with the other within a preset discordance time, the valve will go into a lockout condition such that any downstream pressure in the outlet port (2) will be exhausted to atmosphere through exhaust port (3). There should also be a small, but audible, flow of air out the exhaust port (3) as long as the valve remains in the lockout condition.

If your valve is supplied with the optional status indicator, a lockout condition should be indicated by a change in state of the status indicator pressure switch. See Lockout Indication on page 1.

In order to reset the valve and return it to the "ready-to-run" condition, with supply pressure applied and the pilot solenoids de-energized, momentarily energize the reset solenoid (at least 200 milliseconds). After resetting the valve the lockout condition should be cleared, there should be no pressure present at outlet port (2) and there should no longer be any audible flow of air to exhaust port (3).

If momentarily energizing the reset solenoid does not clear the lockout condition, the valve may need to be serviced. See Valve Maintenance below.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. *Note that the double valve itself does not require air line lubrication.*

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate) and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. It is recommended that the inlet air to the valve be filtered. Disassembly of the valve for cleaning and repair must be done by qualified persons. The testing procedures must be done for valves that have been disassembled and repaired. Lubrication recommended is Owens Corning BR2 Plus grease. It is applied only to the piston seals and bores. Do not lubricate the poppet seals.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32
	Amoco Spindle Oil C
	Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22
	Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11
	Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

Repair kits are available for internal components. Valves can be returned to Ross Controls for repair.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out before beginning any disassembly operation. Service kits are listed on page 3.

STANDARD SPECIFICATIONS

Solenoids: According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Connector socket according to DIN 43650 Form A. Three solenoids, rated for continuous duty.

Standard Voltages: 110 volts AC, 50/60 Hz; 24 volts DC.

Pilot Solenoid Power Consumption (each solenoid): 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

Reset Solenoid Power Consumption: 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

Ambient Temperature: 15° to 122°F (-10° to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered (5 micron recommended), lubricated or unlubricated air (mineral oils according to DIN 51519, viscosity classes 32-46).

Inlet Pressure: 30 to 116 psig (2 to 8 bar).

Pressure Switch (Status Indicator) Rating: Contacts - 5 amps at 250 volts AC, or 5 amps at 30 volts DC.

Application: Category 4 applications and not press clutch/brake applications.

Solenoid Reset: DM2® Series E includes a 3/2 solenoid reset valve. Energize this solenoid momentarily to reset valve after lockout condition occurs. **NOTE:** *The valve is designed such that both pilot solenoids must be de-energized prior to reset, and must remain de-energized until after the reset signal is removed. Otherwise, the valve will not reset.*

Electrical Connectors

Wired connectors have a 2-meter (6-1/2 ft) cord with three 18-gauge conductors. Cord is available in either 6-mm or 10-mm diameter and with or without indicator light.

	Without Light	With Light 24 volts DC	With Light110 volts AC
Wired with 6-mm cord	**721K77**	**720K77-W**	**720K77-Z**
Wired with 10-mm cord	**371K77**	**383K77-W**	**383K77-Z**
For threaded conduit	**723K77**	**724K77-W**	**724K77-Z**
For use with drop cord (cord not included)	**937K87**	**936K87-W**	**936K87-Z**

For additional wiring kit accessories, please see Form NPS011 available at www.rosscontrols.com.

VALVE SERVICE

ROSS would be happy to service this specialized double valve for you at its factory repair center. Call your local distributor or, (in the U.S.) 1-800-GET-ROSS (+706-356-3708 outside the U.S.) for information. If you service the valve yourself, be sure to turn off electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out all power sources before beginning any disassembly operation. Listed below are kits for servicing DM2® Series E double valves, as well as replacement solenoid information.

CAUTION: *Before operating the* DM2® Series E *double valve, be sure to complete the test procedure, on page 1, upon installation and after any maintenance is performed on the valve. Failure to do so could result in personal injury or equipment damage.*

Valve Body Service Kit. This kit is used for complete reconditioning of a valve body and includes poppets, spindles, gaskets, seals, and instructions for use.

Order kit number - **2279K77**

Gasket and Seal Kit. This kit is used when valve bodies are disassembled for cleaning and includes all the necessary gaskets, O-rings, and other seals.

Order kit number - **2280K77**

Status Indicator Assembly Service Kit. This kit is used for complete reconditioning of the status indicator assembly. Pressure switch and connector sold separately - see at right.

Order kit number - **2151H77**

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708.

Replacement Pressure Switch and Connector. This kit is used to replace the pressure switch and electrical connector for the status indicator assembly.

Order kit number - **1104A30**

Solenoid Coils. Order replacement solenoid coils by the following part numbers:

- **306K33165** for 24 volts DC
- **306K33165** for 110 volts AC

Complete Solenoid Pilot and Solenoid Reset Assemblies. Order replacement solenoid assemblies by the following part numbers:

- **851C79165** for 24 volts DC
- **851C79166** for 110 volts AC

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

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7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

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POWER PRESSES

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ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

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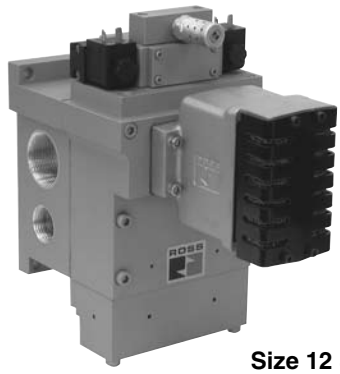
DM|2® Series S
Double Valves Sizes 12 & 30

Thank You!

You have purchased a premium-quality ROSS pneumatic valve. It is a high quality DM2® Series S double valve with dynamic monitoring and inherent lockout capability. The valve is designed for base mounting for ease of installation and maintenance. With care in its installation and maintenance you can expect it to have a long and economical service life.

Before you install this valve, read the information in this folder completely, and save it for future reference. Also refer to the guide, *"Connecting Two DM2® Series S Valves for Separate Clutch & Brake with 904J32-A Kits"* (form No. A10298).



Size 12 & 30

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing this valve in a new or existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. The air supply must not only provide sufficient pressure (*see Standard Specifications, page 3*), but must also provide an adequate flow of air on demand. Otherwise, the valve elements will be momentarily starved for air and the valve may fail to operate.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhaust (Port 3): Do not restrict the air flow from the exhaust port as this can adversely affect the operation of the valve. The valves are factory equipped with a properly sized silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Reset Port (RESET): If your valve is not equipped with a reset solenoid on the valve, then the RESET port should be supplied externally, from a 3/2 normally closed valve. The lines must be of adequate size and be free of crimps and sharp bends. Reset signals must be momentary.

Electrical Supply: DM2® Series S double valves get electrical power through plug-in connectors. The electrical supply must correspond to the voltage and hertz ratings of the solenoids. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer, it must be capable of handling the inrush current without significant voltage drop. See *Standard Specifications* on page 3 for inrush current data.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Standard Specifications* on page 3. Exceeding these values can adversely affect performance and shorten valve life.

Pipe Installation: To install pipe in base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve. To install pipe with parallel threads (e.g., SAE, ISO 228-G, etc.) do not use sealant. After installing pipe into the base ports, use compressed air to blow any debris out of the piping, then install the valve onto the base.

Test: After installation or repair and prior to normal use, the internal lockout feature of the DM2® Series S valve must be tested for proper functioning. Observe normal press operation safety precautions during these tests to avoid personal injury or damage to equipment.

***Note:** Reset may need to be performed prior to beginning the test procedure. Also, both pilot solenoids must be de-energized prior to reset and must remain de-energized until after the reset signal is removed.*

A) Electrically energize both pilot solenoids simultaneously, then de-energize one pilot solenoid. This should result in a valve lock-out and prevent the valve from operating. **B)** Energize both solenoids and the valve should remain in the lockout condition. **C)** De-energize both pilot solenoids and reset the valve. **D)** Electrically energize both pilot solenoids simultaneously again. De-energize the other pilot solenoid this time. Again, this should result in a lockout. **E)** Energize both pilot solenoids. The valve should remain in a lockout condition. **F)** De-energize both pilot solenoids and then reset the valve.

After satisfying these tests, energizing both pilot solenoids simultaneously should result in normal operation.

Fault Indication: If fault indication is desired, ROSS offers a status indicator option that can be used to signal the press controls that a fault has occurred. The status indicator utilizes a pressure switch. The pressure switch has 4 electrical contacts. During normal operation the pressure switch is pressurized. A lockout condition depressurizes the switch until the valve is reset. Contacts 1 and 2 are closed when the switch is depressurized (normally closed) and contacts 1 and 3 are closed when an adequate pressure signal is applied to the switch (normally open).

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ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
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ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE OPERATION

On first operation, or after repair, the pilot valve supply circuit and inherent monitoring elements may need to be reset. This reset is accomplished by applying a momentary air signal to the RESET port or by energizing the optional reset solenoid momentarily on the valve. After reset, the valve will then be ready for operation.

The air supply to each pilot valve is controlled by the position of the inlet poppets. In the ready-for-operation position these poppets are held on their seats and maintain pilot air flow. During shifting of the valve elements the poppets move off seat and momentarily allow pilot air to escape to exhaust. If either valve element fails to operate correctly, the pilot supply to the other valve element will remain connected to exhaust causing the valve to lockout.

The internal monitoring system will lockout the valve if the time difference between both elements shifting fully is longer than approximately 125 milliseconds. This timing is preset by restricting-orifices and chambers in the pilot air circuit.

The main airflow from port 1 to port 2 is via crossflow passages between both main valves, so that both valve elements must be fully shifted in order for port 2 to be pressurized.

If the valve locks out, further operation is prevented until the valve has been reset. Electrical signals to the solenoids must be "off" to allow the valve to be reset.

The DM$^{2®}$ Series S valve is completely self-contained and does not need an external monitoring system.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. *Note that the double valve itself does not require air line lubrication.*

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components which could cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate) and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To clean the valve, use any good commercial solvent. Do *not* scrape varnished surfaces. Also, do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as Dow Corning BR 2 Plus.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In most cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, exhaust the air in the system, and lockout before beginning any disassembly operation. Service kits are listed on page 3.

STANDARD SPECIFICATIONS

Solenoids: According to VDE 0580. Enclosure rating according to DIN 400 50 IP 65. Connector socket according to DIN 43650 Form A. Two solenoids, rated for continuous duty (three with solenoid reset option).

Standard Voltages: 110 volts, 50/60 Hz; 220 volts 50/60 Hz; 24 volts DC.

Pilot Solenoids Power Consumption (each solenoid):

Sizes 12 & 30: 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

Reset Solenoid Power Consumption: 6.0 watts on DC; 15.8 VA inrush and 10.4 VA holding on AC.

Ambient Temperature: 15° to 120°F (-10° to 50°C).

Media Temperature: 40° to 175° F (4° to 80°C).

Flow Media: Filtered (5 micron recommended), lubricated or unlubricated air (mineral oils according to DIN 51519, viscosity classes 32-46).

Inlet Pressure: 30 to 115 psig (2 to 8 bar).

Reset Pressure: For remote reset option – equal to inlet pressure.

Pressure Switch (Status Indicator) Rating: Contacts - 5 amps at 250 volts AC, or 5 amps at 30 volts DC.

Solenoid Reset: Units with solenoid reset include a 3/2 solenoid valve. Energize this solenoid momentarily to reset monitor after lockout condition occurs.

NOTE: *Main solenoids must be off when performing reset procedure.*

Remote Reset: Remote signal to be supplied by customer's 3/2 valve (connect remote signal line to remote RESET port in valve). Apply signal momentarily to reset valve after fault condition occurs.

NOTE: *Main solenoids must be off when performing reset procedure.*

Electrical Connectors

Wired connectors have a 2-meter (6 1/2 ft) cord with three 18-gauge conductors. Cord is available in either 6-mm or 10-mm diameter and with or without indicator light. Specify solenoid voltage for lighted connectors.

	Without Light	With Light
Wired with 6-mm cord	**721K77**	**720K77**
Wired with 10-mm cord	**371K77**	**383K77**
For threaded conduit	**723K77**	**724K77**
For use with drop cord (cord not included)	**937K87**	**936K87**

For additional wiring kit accessories, please see Form NPS011 available at www.rosscontrols.com.

VALVE SERVICE

ROSS would be happy to service this specialized double valve for you at its factory repair center. Call your local distributor or, (in the U.S.) 1-800-GET-ROSS (+706-356-3708 outside the U.S.) for information. If you service the valve yourself, be sure to turn off electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out all power sources before beginning any disassembly operation. Listed below are kits for servicing DM$^{2®}$ Series S double valves, as well as replacement solenoid information.

CAUTION: *Before operating the DM$^{2®}$ Series S double valve, be sure to complete the test procedure (TEST), on page 1, upon installation and after any maintenance is performed on the valve. Failure to do so could result in personal injury or equipment damage.*

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindles, gaskets, seals, and instructions for use.

Size 12.....**2104K77**
Size 30.....**2105K77**

Status Indicator Assembly Service Kit. This kit includes all parts needed for complete reconditioning of the status indicator assembly. Pressure switch and connector sold separately - see below.

Size 12 & 30.....**2151H77**

Replacement Pressure Switch. This kit includes a replacement pressure switch and electrical connector for the status indicator assembly.

Size 12 & 30.....**1104A30**

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:
1-888-TEK-ROSS or 1-706-356-3708.

Solenoid Coils. Order replacement solenoid coils by the following part numbers. Specify voltage and hertz when ordering.

	Pilot solenoids	Reset solenoid
Size 12 & 30	**306K33**	**306K33**

Complete Solenoid Pilot Assemblies. Available for sizes 4 and 8, these assemblies consist of new pilot valve mechanisms and a new solenoid coil, ready to bolt in position on the valve. Specify voltage and hertz when ordering.

	Pilot solenoids	Reset solenoid
Sizes 12 & 30	**1391K79**	**851C79**

Pilot Booster Service Kits. Available for sizes 12 and 30, these kits contain all parts needed for complete reconditioning of a pilot booster. Included are poppets, gaskets, seals, and instructions for use.

Size 12 & 30.....**2106K77**

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS297

HSR Valve

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is called an HSR valve, and is designed to be used in a two-hand control system.

With care in its installation and maintenance you can expect the HSR valve to have a long and reliable service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.

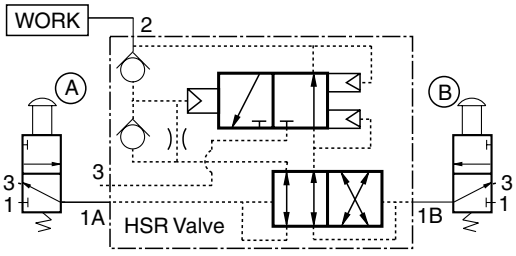
The outlet (port 2 in the diagram at the right) is connected to the equipment to be controlled by the two-hand system. The inlet ports (1A and 1B) are each connected to a 3/2 normally closed hand valve.

To produce an output signal at port 2, both hand valves must be actuated at the same time. Otherwise, port 2 will remain closed. *The HSR valve is designed to produce an output signal only when the two input signals are applied within approximately 0.5 second of one another, and the output volume does not exceed 30 cubic inches.*

CAUTION: An HSR valve can be used as a part of an anti-repeat control (see page 3), but is not a single stroke mechanism as defined by OSHA. An HSR valve should not be used to initiate an automatic cycle which cannot be interrupted by the operator's release of the hand valves. However, if the application calls for such use, the system designer must provide clear instructions and warnings to the operator, as well as barrier guards to prevent injury.

ROSS HSR Valve

Model 1868A2002



TYPICAL HSR VALVE INSTALLATION

Shown above is a typical two-hand control arrangement with a ROSS HSR valve and two hand valves (A and B). The hand valves must be actuated within approximately 0.5 second of one another in order for the HSR valve to produce a signal to the work station. A non-repeat function can be added by the addition of a dump valve as shown on page 3.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in an existing system, the air lines must be blown clean of all contaminants. It is recommended that a 5-micron-rated air filter be installed in the inlet lines close to each of the valves supplying the HSR valve.

Hand Valves: The valves supplying air to the inlets of the HSR valve must have a Cv rating of not less than 0.3, and must be piped to an adequate and consistent supply of air with a pressure in the 30 to 125 psig range.

Valve Inlets (Ports 1A and 1B): Be sure that the lines supplying air to the HSR valve do not restrict the flow of air. The lines must be of nearly equal length, and no less than 3/16" in inside diameter.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The total outlet volume must not exceed 30 cubic inches or the HSR will automatically close the outlet port. If a larger volume must be supplied, use a ROSS Series 27 valve with an HSR valve as its pilot. See page 3 for more information.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

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ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
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ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located as close as possible to the valves actuating the HSR valve is strongly recommended. The filter bowl should be drained regularly, and if the filter's location makes draining difficult, the filter should be equipped with an automatic drain.

Use Only Compatible Lubricants: Although the HSR valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and thereby cause the valve to malfunction. The best oils to use are those specifically compounded for air line lubricator service. A few of the compatible lubricants on the market are listed in the table at the left.

Check Lubricator Supply Rate: A lubricator should put atomized oil into the air line in direct proportion to the rate of air flow. Excessive air line lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute of air flow is adequate. (Note that your HSR valve does not itself require air line lubrication.)

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

Contamination: If dirt contaminates the HSR valve because of inadequate or ineffective air filtration, the valve must be replaced or returned to ROSS for cleaning. Field disassembly of the HSR valve is not recommended.

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

VALVE SPECIFICATIONS

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Input Signals: 30 to 125 psig (2 to 8.5 bar). Both signals must be of the same pressure, and must be applied within 0.5 second of one another in order to produce an outlet signal.

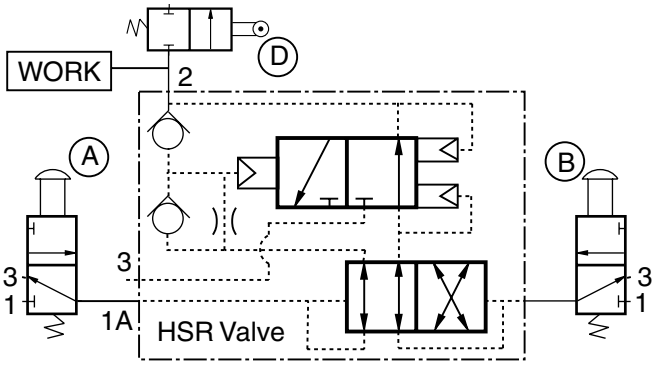
Port Markings on HSR Valve: Inlet ports (1A and 1B) are on the sides of the valve, and are both marked "IN." The outlet port is on the top of the valve, and is marked "OUT."

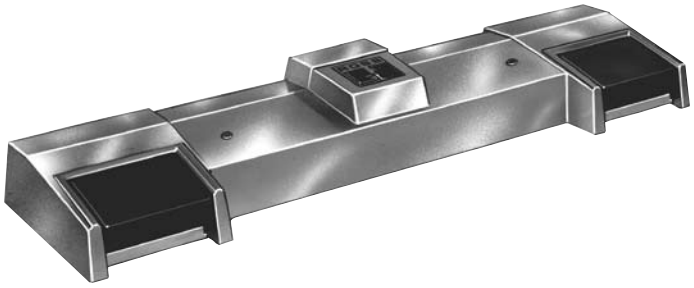
ANTI-REPEAT TWO-HAND CONTROL

An HSR valve can be used in a circuit designed for anti-repeat two-hand control, i.e., a circuit in which actuation of the two hand valves causes the machine to go through one, and only one, work cycle. An example of such a circuit is shown at the right, and consists of two hand valves, an HSR valve, and a dump valve. The remainder of the circuit must be designed so that loss of the HSR outlet air prevents the machine from being reactuated.

The dump valve (D in the diagram at the right) is actuated at the end of a work cycle so that it exhausts the output of the HSR valve. Exhausting the HSR output causes the HSR valve to shift and prevent any further output signal whether valves A and B are actuated or not. A new work cycle can be initiated only after both hands have been removed from the hand valves (A and B), thus allowing the HSR valve to reset itself.

The dump valve (D) must have a flow rating greater than Cv = 0.3, and must be closed at the time of HSR actuation.





TWO-HAND CONTROL STATION

The ROSS two-hand control station is a self-contained system, ready for mounting on a fixture, pedestal, or machine. It requires only two 1/4 pipe connections. The station consists of two 3/2 normally closed hand valves, an HSR valve, and all connecting lines enclosed in a cast aluminum housing. Operation is like that of the two-hand control system described on page 1. An anti-repeat function can also be incorporated by the addition of a dump valve as described above.

HIGH-VOLUME OUTPUT TWO-HAND CONTROL

Where a volume larger than 30 cubic inches must be supplied, the HSR valve alone will not suffice. However, the HSR valve can be used as a pilot valve on a ROSS higher-output Series 27 valve. Such valves are available as either 3-way normally closed valves, or as 4-way valves. Model numbers are shown below.

ROSS Series 27 4-Way Valve with HSR Pilot

PORT SIZES		3-WAY NORMALLY CLOSED VALVES		4-WAY VALVES	
In-Out	Exhaust	Average Cv	Model Number	Average C_V	Model Number
1/4	1/2	2.8	2753A2006	2.5	2756A2006
3/8	1/2	4.0	2753A3006	3.6	2756A3006
1/2	1/2	3.8	2753A4016	3.7	2756A4016
1/2	1	10.0	2753A4006	9.0	2756A4006
3/4	1	12.0	2753A5006	11.0	2756A5006
1	1	14.0	2753A6016	13.0	2756A6016
1	1½	29	2753A6006	23	2756A6006
1¼	1½	31	2753A7006	24	2756A7006
1½	1½	31	2753A8016	25	2756A8016

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS such product is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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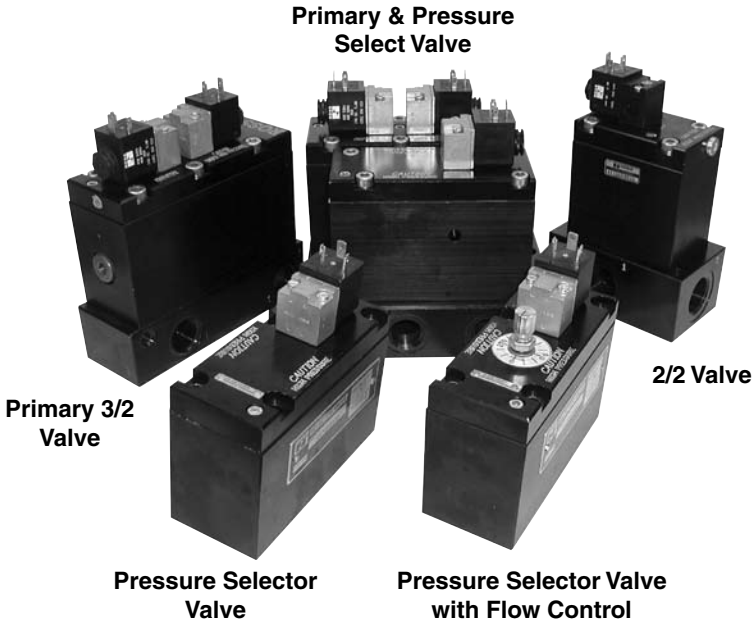
Form SS095

Select 4400 High Pressure Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a ball-poppet valve designed for base mounting, and has been built to the highest standards.

With care in its installation and maintenance, you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.



VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Important Note: *Special care must be taken to prevent injury to humans and/or damage to equipment when working with high pressure products.*

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Port 3): Do not restrict the air flow from the exhaust port of the valve body or pilot body as this can adversely affect the operation of the valve. However, to reduce exhaust noise, an efficient silencer may be used.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the pilot housing. The electrical supply must correspond to these ratings. Otherwise the solenoids are subject to early failure. If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply: Your valve is designated for external pilot supply. A supply line must be connected to the G1/8 pilot supply port in the side of the base. See *Valve specifications* on page 2 for pressure requirements.

Pipe Installation: The pipe ports in the manifolds of the Select4400 valves are designed to use face sealing fittings. Since the pipe threads are not tapered, pipe sealant and tape is not recommended.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Polycarbonate Bowl Warning. Filters and lubricators equipped with polycarbonate bowls are not recommended for use in applications with line pressures greater than 150 psig (10 bar). Use filters and lubricators with metal bowls for applications above 150 psig (10 bar).

Air Line Lubrication. In applications involving the manufacture of food type containers, air line lubrication should *NOT* be used. However, in other non-food type applications it may acceptable to use air line lubrication, depending on the other equipment in your system.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that this valve itself does not require air line lubrication.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt, rust, and varnish which can affect the valve's performance.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32
	Amoco Spindle Oil C
	Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22
	Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11
	Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with NYE 8512S grease.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. Turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation or removing the valve from its base. Service kits for these valves are listed on page 3.

VALVE SPECIFICATIONS

Solenoids: Rated for continuous duty.

Standard Voltage: 24 volts DC; 100–120 volts 60 Hz;

230 volts 50 Hz. Other voltages available on request.

Power Consumption (each solenoid): 11VA inrush,

8.5 VA holding on 50 or 60 Hz, 6 watts on DC. Low-watt coil - 2.8 watts on DC.

Electrical Protection Rating: NEMA 4; IP 65

Materials: Anodized aluminum, stainless steel

Ambient Temperature: 40° to 120°F (4° to 50°C).

Media Temperature: 40° to 175°F (4° to 80°C).

Flow Media: Filtered, dry air – 5 micron minimum.

Inlet Pressure: 0 to 600 psig (0 to 40 bar).*

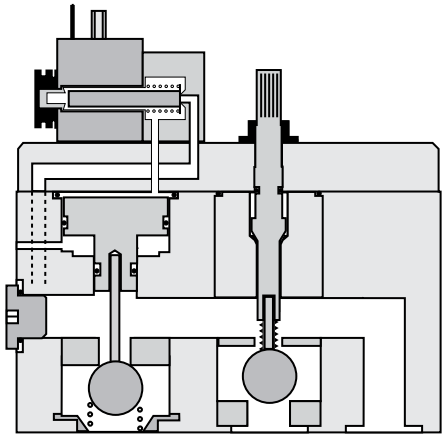
Pilot Supply Pressure: 100 to 150 psig (7 to 10 bar).**

Connector Type: DIN 43650 Type A.

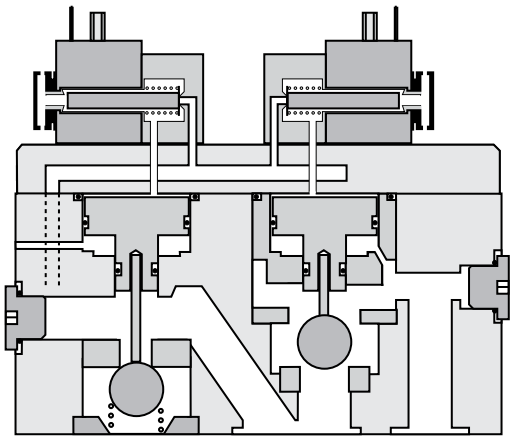
*Contact ROSS for pressures greater than 600 psi (40 bar).
**Solenoid pilots rated for 230 psi (16 bar) available. Consult ROSS.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

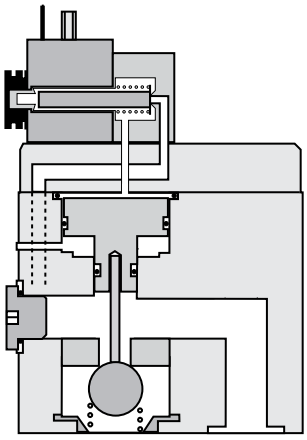
SELECT 4400 VALVE BODIES



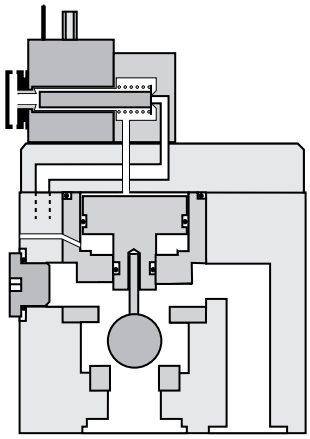
Pressure Select Valve with Flow Control



3/2 Primary Valve



2/2 Normally Closed Valve



2/2 Normally Open Valve

VALVE SERVICE

ROSS would be happy to service this specialized valve for you at its factory repair center (1-800-GET-ROSS). However, if you choose to service this valve yourself, it is strongly recommended that you obtain its free service manual from ROSS in the U.S.A. at 1-800-GET-ROSS.

Listed below are kits for servicing your valve. Distributor information as well as other product information is available at www.rosscontrols.com

Complete Solenoid Pilot Assemblies. These assemblies consist of a new pilot valve mechanism and a new solenoid coil, ready to bolt in position on the valve. Order replacement solenoid pilot assemblies by the following part numbers. Specify voltage and hertz when ordering.

For standard wattage pilots (no override): **1044H79**
For low wattage pilots (with override): **1296G79**

Solenoid Coils. Order replacement solenoid coils by the following part numbers. Specify voltage and hertz when ordering.

For standard wattage: **306K33**
For low wattage: **315K33**

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are ball poppets, pistons, all required gaskets and seals, and instructions for use.

3/2 Primary Valves: **1817H77**
Pressure Select Valves: **1818H77**
2/2 Normally Closed Valves: **1870H77**
2/2 Normally Open Valves: **1869H77**

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS262

Dale Series CP, CX, LF, LX
Compact Poppet & Manifold Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a poppet valve with metal internals designed for inline mounting, and has been built to the highest standards. With care in its installation and maintenance, you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains. A general service manual with more detailed information is available from ROSS upon request.

Series CP, LF Valves

VALVE INSTALLATION

Important Note: *ROSS Dale Series CP, CX, LF, LX valves* ***are not designed as control valves for air clutch/brake mechanisms on mechanical power presses,*** *and must not be installed for such use. Only double valves conforming to OSHA standards should be used in such applications.*

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element.

Valve Outlets (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Port 3): Do not restrict the air flow from the exhaust port of the valve body or pilot body as this can adversely affect the operation of the valve. However, to reduce exhaust noise, an efficient silencer may be used. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the pilot housing. The electrical supply must correspond to these ratings. Otherwise the solenoids are subject to early failure. The power supply must be capable of handling the inrush current without significant voltage drop.

See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:

Solenoid Control: Pressure for the pilot valve is supplied internally for most valves and requires no special connection. However, if your valve is designated for external pilot supply, a 10-32 or 1/8-inch pilot supply line must be connected to port X-1 in the manifold.

See *Valve specifications* on page 2 for pressure requirements.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

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ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate (note that this valve itself does not require air line lubrication, but some optional adaptors do, i.e. air index, etc.).

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32;
Amoco	Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation.

Service kits for these valves are listed on page 3.

VALVE SPECIFICATIONS

Solenoids: AC or DC power. Rated for continuous duty. Voltage and hertz ratings shown on pilot housing.

Standard Voltages: 120 volts AC, 50/60 Hz; 24 volts DC.

Power Consumption:
Series *CP 2-port 2-position (2/2) normally closed (NC) & normally open (NO) 1/2" and 1" inlet, Series CP 3/2 (NC & NO) 1/2" inlet:* 3 VA on AC; 2.5 watts on DC.

Series CP 2-port 2-position 1½" and 2½" inlet, Series CP 3/2 (NC & NO) 1" inlet, Series LF 2/2 except 3/8" and 1/2" inlet: 36 VA inrush, 23 VA holding on AC; 15 watts on DC.

Series LF 2-port 2-position 3/8" and 1/2" inlet: 9.8 VA on AC; 7.5 watts on DC.

Ambient Temperature: 40° to 120°F (4° to 50°C).

Media Temperature: 40° to 175°F (4°C to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure:

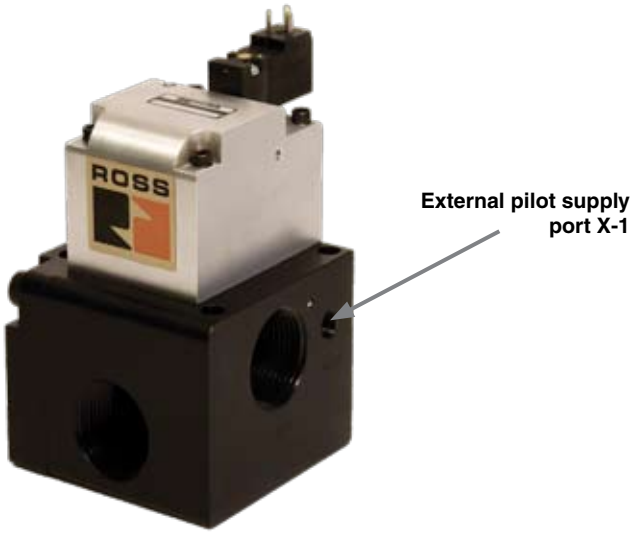
Solenoid Pilot: Vacuum to 145 psig (10 bar), (vacuum service requires external pilot supply).
Pressure Controlled : Vacuum to 250 psig (17 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure. For vacuum service models requiring external pilot supply, a pilot pressure of at least 30 psig is required.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

CONVERSION TO EXTERNAL PILOT SUPPLY:

Your ROSS valve may be converted to external pilot supply by simply installing a 10-32 or 1/8" air supply to the X-1 port on the base manifold.
See figure on the right.



VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center (1-800-GET-ROSS). However, if you choose to service this valve yourself, it is strongly recommended that you obtain a free service manual from ROSS in the U.S.A. at 1-800-GET-ROSS.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are poppets, spindle, all required gaskets and seals, and instructions for use.

Solenoid Pilot Kits. These kits contain all parts needed to recondition the pilot valve. Order by the following kit numbers:

Series CP 2/2 NC 1/2" & 1" inlet - **1467B79**
Series CP 3/2 NC 1/2" inlet - **1467B79**

Series CP 2/2 NO 1/2" & 1" inlet - **1468B79**
Series CP 3/2 NO 1/2" inlet - **1468B79**

Series CP 2/2 1½" & 2½" inlet - **1404H79**
Series CP 3/2 1" inlet - 1404H79
Series LF 2/2 (except 3/8" and 1/2" - **1404H79**

Series LF 2/2 3/8" & 1/2" - **1469H79**

Solenoids. Replacement solenoids can be ordered by the part numbers listed below. Specify the required voltage and hertz when ordering.

Series CP 2/2 NC 1/2" & 1" inlet - **1467B79**
Series CP 3/2 NC 1/2" inlet - **1467B79**

Series CP 2/2 NO 1/2" & 1" inlet - **1468B79**
Series CP 3/2 NO 1/2" inlet - **1468B79**

Series CP 2/2 1½" & 2½" inlet - **360K33**
Series CP 3/2 1" inlet - **360K33**
Series LF 2/2 (except 3/8" and 1/2" inlet) - **360K33**

Series LF 2/2 3/8" & 1/2" - **308K33**

Valve Type	Model Type	Port Size	Valve Body Kit*
2/2 Normally Closed	CP1/LF1	3/8 - 1/2	2295H77
		3/4 - 1	2297H77
		1¼ - 1½	2299H77
		2 - 2½	2300H77
2/2 Normally Open	CP2/LF2	3/8 - 1/2	2295H77
		3/4 - 1	2297H77
		1¼ - 1½	2299H77
		2 - 2½	2300H77
3/2 Normally Closed	CP3	3/8 - 1/2	2296H77
		3/4 - 1	2298H77
3/2 Normally Open	CP4	3/8 - 1/2	2296H77
		3/4 - 1	2298H77

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:
1-888-TEK-ROSS or 1-706-356-3708

Dale Series LT Leak Test
Solenoid Pilot Valve & Manifolds

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a leak tight, compact solenoid pilot valve designed with metal internals, and has been built to the highest standards. With care in its installation and maintenance, you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains. A general service manual with more detailed information is available from ROSS upon request.

VALVE INSTALLATION

2/2 Valves

The 2/2 LT series valves combines the flexibility of a standard 2-way valve with the added benefits of high flow and zero leakage. The valve can be used as a bypass valve or as a zero leak isolation valve for a leak test circuit. The manifold has a single internal high flow poppet which is actuated by an external solenoid. The valve's pressure range is from 2 to 145 psi and has a Cv of 2.2.
The LT valve is normally closed. Therefore, if power is lost or if a safety stop has cut power, the supply pressure will be closed.

Pilot Pressure: Pilot pressure must be maintained at all times and must be equal to or greater than the inlet pressure to prevent valve failure. To prevent loss of pilot pressure, it is strongly recommended to use the same air supply for both the inlet and pilot pressures.
Normally Closed - The LT is a normally closed 2-way valve. The supply pressure on the "INLET" port is closed.
Electrical Power Loss: Will cause the valve to return to a normally closed position. Downstream line pressure will not be exhausted.

Operation:
Actuation of the solenoid will allow air to flow from the "INLET' port to the "TEST" and "P1" ports.

Applications:
- Isolation Valve: P1 - Gauge or Pressure Sensor Port
- Bypass/Pre-fill: P1 - Blocked or Gauge Port.

3/3 Manifold

The 3/3 LT series manifold was designed for pressure decay tests or by pass fill applications currently using 2-way valves.
Benefits include: high flow, zero isolation leakage, and elimination of tubing. Using the manifold with standard industry leak test units, allows the user to rapidly pre-fill, isolate and exhaust the unit under test improving cycle times while still enjoying the benefits of a "benchtop" leak test unit. The manifold consists of two internal high flow poppets which are actuated by two external solenoids. The first solenoid controls the supply pressure and the isolation functions, while the second solenoid controls the exhaust. The manifold's pressure range is from 2 to145 psi and has a Cv of 2.2 making it ideal for improving test times.
The supply pressure poppet is normally closed and the exhaust poppet is normally open. Therefore, if power is lost or if a safety stop has cut power, the supply pressure will be closed and the unit under test will be evacuated.

Pilot Pressure: Pilot pressure must be maintained at all times and must be equal to or greater than the inlet pressure to prevent valve failure. To prevent loss of pilot pressure, it is strongly recommended to use the same air supply for both the inlet and pilot pressures.
Normally Closed - The LT is a normally closed 3-way valve. The supply pressure on the "INLET" port is closed and the "TEST" and "P1" ports flow through the "EXHAUST" port.
Electrical Power Loss: Will cause the valve to return to a normally closed position. The inlet pressure will be closed and downstream test pressure will be exhausted.

Operation:
Pressure Decay Test
Step 1 - Close the exhaust by actuating the exhaust solenoid.
Step 2 - Open inlet pressure by actuating the fill solenoid.
Step 3 - Allow time to fill and settle.
Step 4 - Monitor pressure drop on port "P1" to determine if there is a leak.

Applications:
- Pressure Decay Test: P1 - Pressure Sensor Port
- Bypass/Pre-fill: P1 - Blocked or Gauge Port
- Vacuum & Fill: P1 - Gauge Port, Exhaust - Vacuum Port, Inlet - Fill Port.

VALVE INSTALLATION

3/4 Manifold

The 3/4 LT series manifold was designed for test applications currently using standard 3-way and 2-way valves.
Benefits include: high flow, zero isolation leakage and elimination of tubing. The manifold can be configured for flow tests, pressure decay tests and differential pressure tests.
The manifold consists of three internal high flow poppets which are actuated by three external solenoids. The first solenoid controls the supply pressure, the second solenoid controls the isolation and the third controls the exhaust. Independent operation of these functions provides exceptional flexibility and eliminates the need for two separate valves.
The supply pressure poppet is normally closed and the exhaust poppet is normally open. Therefore, if power is lost or if a safety stop has cut power, the supply pressure will be closed and the unit under test will be evacuated.

Pilot Pressure: Pilot pressure must be maintained at all times and must be equal to or greater than the inlet pressure to prevent valve failure. To prevent loss of pilot pressure, it is strongly recommended to use the same air supply for both the inlet and pilot pressures.
Normally Closed - The LT is a normally closed 4-way valve. The "INLET" port is normally closed and the "TEST", "P1", "P2" and "P3" ports flow through the "EXHAUST" port.
Electrical Power Loss: Will cause the valve to return to a normally closed position. The inlet pressure will be closed and downstream test pressure will be exhausted.

Operation:
Pressure Decay Test:
Step 1 - Close the exhaust by actuating the exhaust solenoid.
Step 2 - Open inlet pressure by actuating the fill solenoid.
Step 3 - Allow time to fill and settle.
Step 4 - Close the isolation poppet by actuating the isolation solenoid.
Step 5 - Close the inlet pressure by deactivating the fill solenoid.
Step 6 - Exhaust the valve cavity pressure by deactivating the exhaust solenoid.
Step 7 - Monitor pressure drop on port "P3" to determine if there is a leak.
Step 8 - Exhaust the part under test by deactivating the isolation solenoid.

Flow Test: Follow steps1 through 4 from above.
Step 5 - Monitor flow from port "P2" to port "P3". ("P2" connected to flow sensor inlet, "P3" connected to flow sensor outlet.)
Step 6 - Close the inlet pressure by deactivating the fill solenoid.
Step 7 - Exhaust the part under test by deactivating the isolation and exhaust solenoids.

Differential Pressure Test: Follow steps 1 through 5 from above.
Step 6 - Monitor the difference in pressure between ports "P2" and "P3". ("P2" reflects test part press. "P3" reflects ref volume press.)
Step 7 - Exhaust the part under test and the reference volume by deactivating the isolation and exhaust solenoids.

Applications:
- Pressure Decay Test: P1 - Blocked, P2 - Blocked, P3 - Pressure Sensor Port
- Flow Test: P1 - Blocked, P2 - Flow Sensor Inlet Port, P3 - Flow Sensor Outlet Port
- Differential Pressure Test: P1 - Reference Volume Fill Port, P2 - Pressure Sensor Port 1, P3 - Pressure Sensor Port 2.

4/4 & 5/4 Manifolds

The 4/4 and 5/4 LT series manifolds provide a complete pneumatic control for applications requiring two supply lines. Benefits include: high flow, zero isolation leakage and elimination of tubing. The manifold can be configured for flow tests, pressure decay tests and differential pressure tests.
The manifold consists of four internal high flow poppets which are actuated by four external solenoids. Two solenoids control the supply pressure, the second solenoid controls the isolation and the third controls the exhaust. Independent operation of these functions supports many applications including: dual pressure tests, vacuum and fill tests or over fill and relieve tests.
The supply pressure poppets are normally closed and the isolation and exhaust poppets are normally open. Therefore, if power is lost or if a safety stop has cut power, the supply pressure will be closed and the unit under test will be evacuated.

Applications:
- Pressure Decay Test: P1 - Pressure Sensor Port
- Flow Test: P1 - Pressure Sensor Port, P2 - Flow Sensor Inlet Port, P3 - Flow Sensor Outlet Port
- Differential Pressure Test: P1 - Pressure Sensor Port 1, P2 - Pressure Sensor Port 2

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate (note that this valve itself does not require air line lubrication, but some optional adaptors do, i.e. air index, etc.).

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as Dow Corning BR2-Plus.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation.

VALVE SPECIFICATIONS

Pilot Solenoid: DC power. Rated for continuous duty.
Standard Voltages: 24 volts DC; 120 volts AC, 50 Hz.
Power Consumption:
Per Solenoid: 2.5 watts on DC; 3 VA on AC.
Ambient/Media Temperature:
40° to 120°F (4° to 50°C).

Flow Media: Filtered air; 5 micron recommended.
Sensor Port: 1/8 NPT sensor ports.
Pilot Pressure: 50 to145 psi (3.4 to 10 bar). Must be equal to or greater than inlet pressure.
Inlet Pressure: 2 to145 psi (0.13 to 10 bar).
Port Threads: NPT standard, BSPP.

VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center (1-800-GET-ROSS). However, if you choose to service this valve yourself, it is strongly recommended that you obtain a free service manual from ROSS in the U.S.A. at 1-800-GET-ROSS.

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:
1-888-TEK-ROSS or 1-706-356-3708

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS051

STANDARD CAUTIONS

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5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

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ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS such product is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS050

Series SV27 Sensing Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a poppet valve designed for inline mounting and has been built to the highest standards.

With care in its installation and maintenance, you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains. A general service manual with more detailed information is available from ROSS upon request.

2/2 Normally Closed Sensing Valve

2/2 Normally Closed PO Checks

3/2 Normally Closed Sensing Valve

Category–2 applications (not for mechanical stamping presses)*

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

***Important Note:** *ROSS Series SV27 valves are not designed as control valves for air clutch/brake mechanisms on mechanical power presses and must not be installed for such use. Only double valves conforming to local and/or international standards shall be used in such applications.*

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element.

Valve Outlet (Port 2): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Port 3): Do not restrict the air flow from the exhaust port of the valve body or pilot body as this can adversely affect the operation of the valve. However, to reduce exhaust noise an efficient silencer may be used. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 db, and produce little back pressure.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the pilot housing. The electrical supply must correspond to these ratings. Otherwise, the solenoids are subject to early failure. If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:

Pressure Control: Connect a 1/4-inch control line to the threaded port in the air cap at the top of the valve. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for the pilot valve is supplied internally for most valves and requires no special connection. However, if your valve is designated for external pilot supply, a 1/8-inch pilot supply line must be connected to port X-1 in the pilot housing. See *Valve Specifications* on page 2 for pressure requirements.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

Outlet Pressure Verification: An auxiliary 1/8 NPT port, which is connected to the outlet port (2), is provided in the sensing valve. An optional pressure indicator (988A30) or pressure switch kit (608A86) may be installed in this port to sense the presence of pressure in the outlet port (2).

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VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate. (Note that this valve itself does not require air line lubrication, but some optional adaptors do, i.e. air index, etc.)

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied. To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, exhaust the air in the system, and lock-out before beginning any disassembly operation.

Service kits for these valves are listed on page 3.

VALVE SPECIFICATIONS

Pressure Controlled

Switch Current/Voltage Max. :** 2.5 A/120 volts AC.

Switch Current/Voltage Min. :** 20 mA/24 volts DC.

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 40 to 150 psig (2.8 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoid: Rated for continuous duty. Voltage and Hertz ratings shown on pilot housing.

Power Consumption:

Size 5 PO Check : 15.8 VA inrush, 12.8 VA holding on AC; 5.8 watts on DC.

Size 7 : 87 VA inrush, 30 VA holding on AC; 14 watts on DC.

Switch Current/Voltage Max. :** 2.5 A/120 volts AC.

Switch Current/Voltage Min. :** 20 mA/24 volts DC.

Temperature Range:

Ambient: 40°F to 120°F (4°C to 50°C)

Media: 40°F to 175°F (4°C to 80°C).

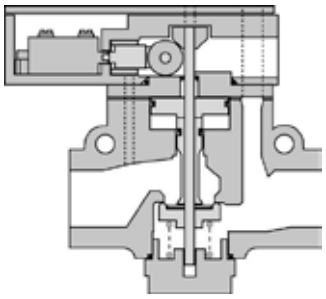
Flow Media: Filtered air.

Inlet Pressure: 40 to 150 psig (2.8 to 10 bar).

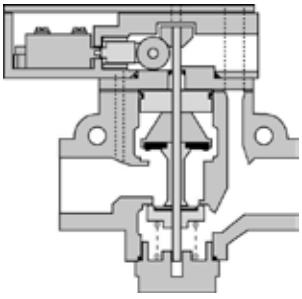
Pilot Pressure: Must be equal to or greater than inlet pressure.

**Electrical life of switch varies with conditions and voltage; rated in excess of 15 million cycles.

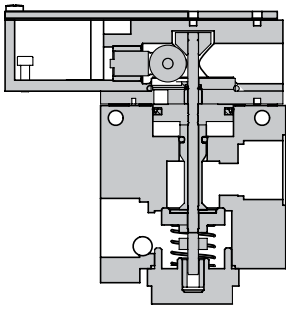
SERIES SV27 VALVE BODIES



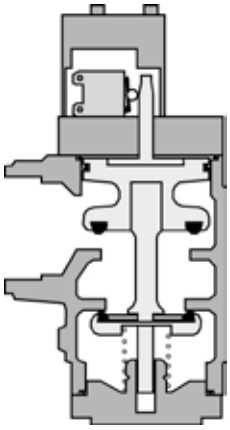
2/2 Normally Closed



3/2 Normally Closed



PO Checks



3/2 Normally Closed Basic Body Size 9 (side view)

VALVE SERVICE

ROSS would be happy to service this valve for you at its factory repair center (1-800-438-7677 inside the U.S. or 706-356-3708 outside the U.S.). However, if you choose to service this valve yourself, it is strongly recommended that you obtain a free service manual from your local ROSS distributor. Distributor information as well as downloadable service manuals are available at www.rosscontrols.com.

Sensing Module and Valve Body Service Kits. These kits contain all parts needed for complete replacement of the sensing module, and reconditioning of the main valve body as well. Included are sensing module, poppets, spindle, all required gaskets & seals, and instructions for use.

Valve Type	Basic Size*	Sensing Module & Valve Body Kit
2/2	5*	2065H77
	7*	2197H77
	9*	2199H77
3/2	5*	2062H77
	7*	2198H77
	9*	2200H77
PO Check	5*	2281H77
	7*	2282H77

Solenoid Pilot Kits. These kits contain all parts needed to recondition the pilot valve. Order by the following kit numbers:

For single solenoid pilots: **946K87**
For size 5 PO Check: **851C79**

Solenoids. Replacement solenoids can be ordered by the part numbers listed below. Specify the required voltage and hertz when ordering.

For single solenoid pilots: **411B04**
For size 5 PO Check: **306K33**

Switch Kit. Replacement safety-rated switch (DPST) and wiring harness:

For "A" & "B" modification basic size(s) 5 & 7*: **2068H77**
For "C" modification basic size(s) 5 & 7*: **2286H77**
For basic size 9*: **2201H77**

*** NOTE:**

Modification letter is designated by the 6th digit in the model #.
For example, SV27N<u>A</u>305507PSAA1A.
Basic size is designated by the 9th digit in the model #.
For example, SV27NA30<u>5</u>507PSAA1A is a basic size 5 valve.

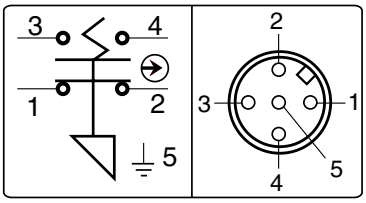
Pressure Verification Port. Enhanced safety can be achieved by installing an optional visual pressure indicator (988A30) or pressure switch kit (608A86) into the 1/8 NPT pressure verification port (PV) located in the sensing valve.

Wiring Diagrams. Below are the wiring diagrams for the DPST switch in the sensing module (top) and the SPST switch in the optional pressure switch kit, 608A86 (bottom).

Sensing Module Switch Wiring & Pilot Wiring

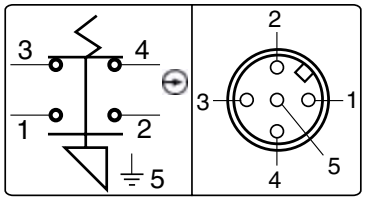
Switch Wiring For Basic Sizes 5 & 7*

Switch is de-actuated when valve is in de-actuated position.

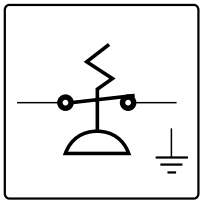


Switch Wiring For Basic Size 9*

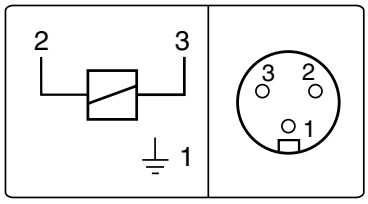
Switch is actuated when valve is in de-actuated position.



Optional Pressure Switch Wiring



Pilot Wiring



If you need additional information, or have any questions about installing or servicing your valve, call ROSS *Technical Services* in the U.S.A. at: **1-888-TEK-ROSS(835-7677)** or 1-706-356-3708.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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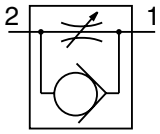
Series 19 Flow Control Valves and Check Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is designed for in-line mounting, and has been built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. Please take a few minutes to look over the following information, and save it for the useful service information it contains.



Flow Control

Check Valve

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

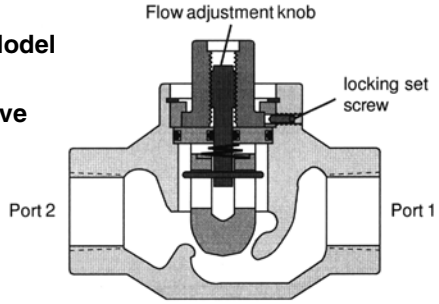
Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants.

Valve Inlet (Port 1): Be sure that the inlet line is of adequate size and does not restrict the air supply.

Valve Outlet (Port 2): For meter out applications, the flow control valve port 2 must be connected to the inlet port of the actuator. For maximum control of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism.

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

Cross Section of Model 1968E2007 Flow Control Valve



IDENTIFICATION and OPERATION

FLOW CONTROL VALVES

Free flow from port 1 to port 2; controlled flow from port 2 to port 1.

Loosen locking nut, turn screw clockwise to reduce air flow; counterclockwise to increase flow. Tighten locking nut.

Turn knob counterclockwise to reduce air flow; clockwise to increase flow.

Loosen locking collar (where provided). Turn knob or screw clockwise to reduce air flow; counterclockwise to increase flow. Tighten locking collar.

Turn knob clockwise to reduce air flow; counterclockwise to increase flow.

CHECK VALVES

Allow air flow from port 1 to port 2; block reverse flow.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a ROSS 5-micron-rated air filter is strongly recommended. Install the filter upstream of and as close as possible to the directional valve that supplies air to the flow control or check valve. The filter bowl should be drained regularly, and if the filter's location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate: A ROSS lubricator should put atomized oil into the air line in direct proportion to the rate of air flow. Excessive air line lubrication can cause puddling in valves and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute of air flow is adequate. (Note that your ROSS valve does not itself require air line lubrication.) See page 3 for a partial list of lubricants that are compatible with the materials in ROSS valves and are suitable for use in compressed air systems.

Cleaning Valve: If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt which can affect the valve's performance, and so require cleaning.

To clean the valve use any good commercial solvent. Do *not* scrape varnished surfaces. Also, do not use chlorinated solvents or abrasive materials. The former can damage seals, and abrasives can do permanent damage to metal parts.

Replace Worn Components: After long usage the poppets may show signs of wear. The valve can be reconditioned with the use of ROSS service kits. See below for information about such kits.

STANDARD SPECIFICATIONS

Ambient/Media Temperature:
40° to 175°F (4° to 80°C).
Flow Media: Filtered air; 5 micron recommended.
Inlet Pressure: 5 to 150 psig (0.3 to 10 bar).

VALVE SERVICE

The service kits listed below contain all of the parts needed for complete reconditioning of the valve.
Service kits are *not available* for all flow control and check valves.
Note that some model numbers may be preceded by D or S.

Valve Model	Service Kit
1968 B2007	695K87
E2007	1168K77
B3007	695K87
E3007	1168K77
B4007	696K87
E4007	1169K77
A4107	1701K77
B4017	696K87
A4F07	1701K77
B5007	696K87
E5007	1169K77
A5107	1701K77
A5H07	1701K77
B6007	697K87
E6007	1170K77
B6017	696K87
A6107	1702K77
A6117	1701K77

Valve Model	Service Kit
1968 A6K07	1702K77
A6K17	1701K77
B7007	697K87
E7007	1170K77
A7107	1702K77
A7L07	1702K77
B8007	698K87
B8017	697K87
A8107	1703K77
A8117	1702K77
A8M07	1703K77
A8M17	1702K77
B9007	698K87
B9017	698K87
A9107	1703K77
A9117	1703K77
A9N07	1703K77

COMPATIBLE LUBRICANTS

Although air line lubrication is not required for most ROSS valves, other mechanisms in the system may need such lubrication. When a lubricator is used it should be supplied only with oils which are compatible with the materials used in the valves for seals and poppets. Generally speaking, these are petroleum base oils with oxidation inhibitors, and aniline point between 180°F (82°C) and 220°F (104°C) and an ISO 32, or lighter, viscosity. Oils with phosphate type additives, such as zinc dithiophosphate, must be avoided because they can harm polyurethane valve components. Diester oils should be avoided because they harm Buna-N elastomers.

Some of the available compatible lubricants are listed at the right. However, oil manufacturers sometimes change the chemistry of their oils. The oils listed, although believed to be compatible at the time of printing, could change without notice. Therefore, the best oils to use are those specifically compounded for air line lubricator service. If it is a synthetic oil, you should contact the oil manufacturer for compatibility information.

Maker	Brand Name
Amoco	American Industrial Oil 32 Amoco Spindle Oil C Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22 Teresstic 32
Mobil	DTE (light) Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T 32
Sun	Sunvis 11 Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

If you need additional information or have questions about installation or servicing, call ROSS Technical Services at:

1-888-TEK-ROSS (835-7677) or (706)356-3708

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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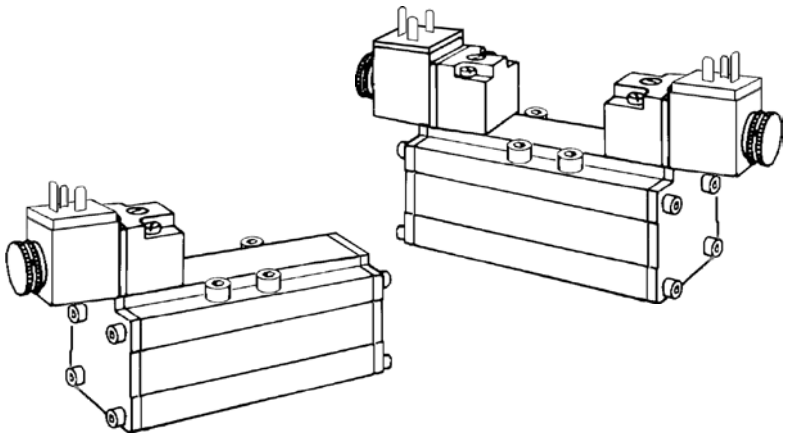
Series W60 ENERGYSAVER® Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a stainless-steel spool-and-sleeve valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.



VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

APPLICATION WARNING:

When inlet pressure is 45 psig (3 bar) or less, the double and single solenoid ENERGYSAVER® valves will pressurize port 2 and exhaust port 4, regardless of applied solenoid signals. This feature, which occurs when inlet pressure is below 45 psig (3 bar), must be taken into consideration in your application design in order to avoid the potential for personal injury or property damage.

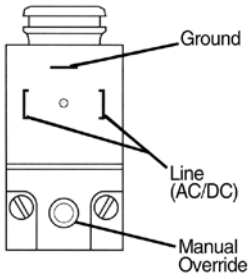
Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports 2 & 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports 3 & 5): To reduce exhaust noise use an efficient silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Electrical Supply: The voltage and hertz ratings for solenoid pilot-operated valves are printed on the side of each solenoid. It is important that the electrical supply used to power the valve is equal to these ratings to avoid possible solenoid burnout. The electrical connection for such valves is achieved by means of a connector whose connections correspond to the prongs pictured in the sketch of a typical solenoid pilot.



If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:
Solenoid Control: Pressure for the pilot valves is supplied from the inlet port. Be sure that port 14 in the base is plugged or pilot air will escape. Minimum operating pressure for the Series W60 ENERGYSAVER® valves is 45 psig (3 bar).

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located as close to the valve as possible is strongly recommended. The filter bowl should be drained regularly. If the filter's location makes manual draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate: A lubricator should put atomized oil into the air line in direct proportion to the rate of air flow. Excessive air line lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute of air flow is adequate. (Note that your ROSS valve does not itself require air line lubrication.) See next column for a partial list of lubricants that are compatible with ROSS valves and are suitable for use in compressed air systems.

Compatible Lubricants: Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and thereby cause the valve to malfunction. The best oils to use are those specifically compounded for air line lubricator service.

Cleaning Valve: If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish, which can affect the valve's performance. To clean the valve use a solvent which will dry without leaving a residue. This is especially important for the spool-and-sleeve assembly. Do not use a chlorinated solvent or abrasive materials which can damage seals or do permanent damage to metal parts.

To reassemble the spool and sleeve put one drop of Anderol 735 (or equivalent lubricant) on each spool land. Insert the spool into the sleeve and rotate it several times to ensure even distribution of the lubricant.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

If the valve is used in a non-lubricated application, do not use a lubricant for reassembly, which can dry out and leave a residue. Dry assembly of the spool and sleeve is preferable. Each spool and sleeve is a matched set, so care must be taken not to reverse the position of the spool in the sleeve.

Before inserting the spool-and-sleeve into the valve body, very lightly lubricate the O-rings with a lubricant such as those shown below. *Do not use Anderol; it causes the O-rings to deteriorate.*

Electrical Contacts: In the external electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components: After long usage the spool and sleeve may show signs of wear, as indicated by excessive air leakage between ports. The valve can be completely reconditioned with the use of a ROSS valve body service kit. See page 3 for information about such kits.

VALVE SPECIFICATIONS

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoids: Rated for continuous duty. Voltage and Hertz ratings printed on solenoid coils.

Standard Voltages:

100 – 110 volts 50 Hz; 100 – 120 volts 60 Hz;
200 – 240 volts 50/60 Hz; 24, 110 volts DC.

Temperature Ranges:

Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 60 to 120 psig (4 to 8 bar).

Manual Override: Flush, non-locking.

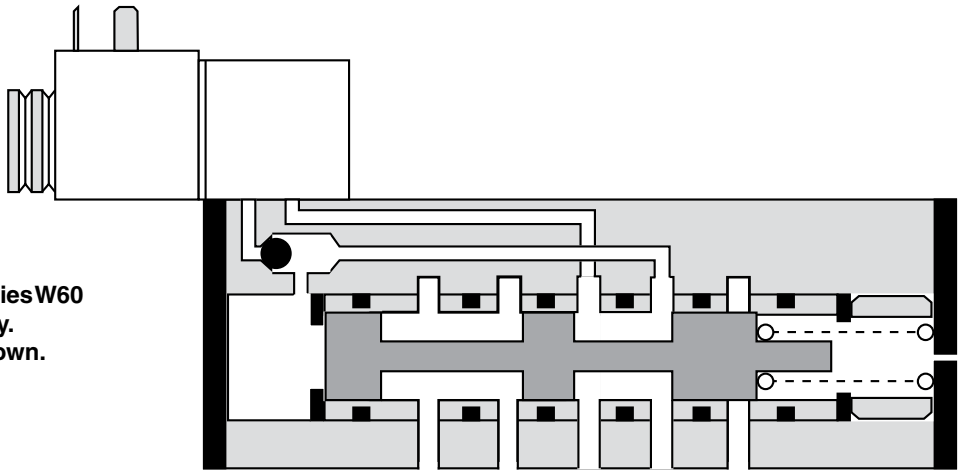
VALVE OPERATION

Traditionally, standard valves apply the same pressure for extending *and* retracting double acting cylinders. However, this new ENERGYSAVER® valve revolutionizes the way cylinders are controlled, by reducing the cylinder retract pressure.

The Series ENERGYSAVER® valve is a 5-port, 2-position, sub-base mounted valve that supplies full line pressure to port 4 and reduced pressure [30 psig (2 bar)] to port 2. This provides full cylinder force to move the load, but returns the cylinder with less pressure thus reducing your compressed air consumption by up to 30%. Although reduced, the pressure in port 2 is enough for quick return of the cylinder. The energy saving function is accomplished by action of the spool and works as quickly as a pressure regulator.

Single Solenoid Models: Energize solenoid (14) to cause the valve to supply line pressure to port 4. This causes the cylinder to extend. De-energize the solenoid to retract the cylinder. The valve switches positions to supply reduced pressure to port 2 in order to retract the cylinder. Because the cylinder gets retracted with reduced pressure, less energy will be consumed.

Double Solenoid Models: Momentarily energize solenoid (14) to cause the valve to supply line pressure to port 4. This causes the cylinder to extend. Now, in order to retract the cylinder, momentarily energize the other solenoid (12) to supply reduced pressure to port 2. Because the cylinder gets retracted with reduced pressure, less energy will be consumed.



Cross section of a ROSS Series W60 ENERGYSAVER® valve body. Single solenoid model shown.

VALVE SERVICE

Valve Body Service Kits. These kits contain all parts needed for a complete reconditioning of a valve body. Included are a spool-and-sleeve assembly, all required gaskets and seals, and instructions for use.

Solenoid Coils: Replacement coils can be ordered by part number **306K33.** Specify the correct voltage and hertz when ordering.

Complete Solenoid Pilot Assemblies. These consist of new pilot valve mechanisms and a new coil, ready to bolt in position on the valve. Order by part number **851C79**, and specify the correct voltage and hertz

Valve-to-Base Gasket. If your valve is removed from its base for any reason, a new valve-to base gasket must be used to ensure a leak-free seal. (This gasket is included as a part of all valve body service kits.)

Valve Model Numbers	Valve Body Service Kit	Valve-to Base Gasket
W6076A2957	1954K77	617B11
W6076A4957	1956K77	619B11
W6076A2961	1974K77	617B11
W6076A4961	1976K77	619B11

If you need additional information or have questions about installation or servicing your valve, call ROSS *Technical Services* at:
1-888-TEK-ROSS (835-7677) or (706)356-3708

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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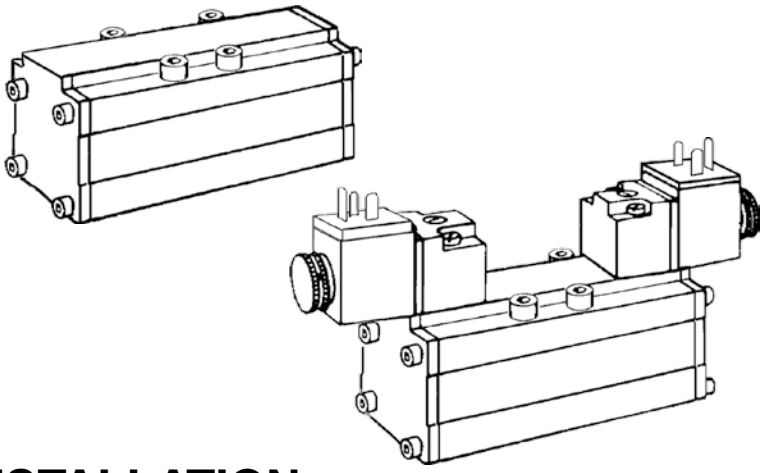
Series W60 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a stainless-steel spool and sleeve valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.



VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

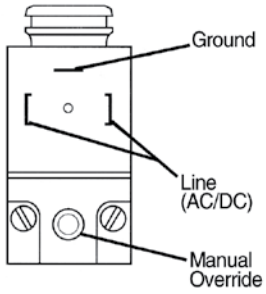
Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports 2 & 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports 3 & 5): To reduce exhaust noise use an efficient silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Electrical Supply: The voltage and hertz ratings for solenoid pilot-operated valves are printed on the side of each solenoid. It is important that the electrical supply used to power the valve is equal to these ratings to avoid possible solenoid burnout. The electrical connection for such valves is achieved by means of a connector whose connections correspond to the prongs pictured in the sketch of a typical solenoid pilot.



If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:

Pressure Control: For valves with single remote pressure control, connect the control line to port 14 in the sub-base or manifold. For valves with double remote pressure control, connect the control lines to both ports 12 and 14 in the base. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for the pilot valves is supplied from the inlet port. Be sure that port 14 in the base is plugged or pilot air will escape. If the valve must operate with an inlet pressure less than the required pilot pressure (see *Valve Specifications* on page 2), an external pilot supply of sufficient pressure must be provided. Connect the external pilot supply to port 14 in the base.

Vacuum or Non-Air Service: Such applications require an external pilot supply for solenoid valves. Connect to port 14 in the base.

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

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ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
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DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located as close to the valve as possible is strongly recommended. The filter bowl should be drained regularly. If the filter's location makes manual draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate: A lubricator should put atomized oil into the air line in direct proportion to the rate of air flow. Excessive air line lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute of air flow is adequate. (Note that your ROSS valve does not itself require air line lubrication.)

Compatible Lubricants: Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and thereby cause the valve to malfunction. The best oils to use are those specifically compounded for air line lubricator service.

Cleaning Valve: If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance. To clean the valve use a solvent which will dry without leaving a residue. This is especially important for the spool-and-sleeve assembly. Do not use a chlorinated solvent or abrasive materials which can damage seals or do permanent damage to metal parts.

To reassemble the spool and sleeve put one drop of Anderol 735 (or equivalent lubricant) on each spool land. Insert the spool into the sleeve and rotate it several times to ensure even distribution of the lubricant. If the valve is used in a non-lubricated application, do not use a lubricant for reassembly which can dry out and leave a residue. Dry assembly of the spool and sleeve is preferable. Each spool and sleeve is a matched set, so care must be taken not to reverse the position of the spool in the sleeve.

Before inserting the spool-and-sleeve into the valve body, very lightly lubricate the O-rings with a lubricant compounded for use on Buna-N seals. *Do not use Anderol; it causes the O-rings to deteriorate.*

Electrical Contacts: In the external electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components: After long usage the spool and sleeve may show signs of wear, as indicated by excessive air leakage between ports. The valve can be completely reconditioned with the use of a ROSS valve body service kit. See page 3 for information about such kits.

VALVE SPECIFICATIONS

Pressure Controlled

Temperature Range: 4° to 80°C (40° to 175°F).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: Vacuum to 10 bar (150 psig).

Pilot Pressure:

Size 1: At least 2 bar (30 psig).
Sizes 2 and 3: At least 1 bar (15 psig).

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoids: Rated for continuous duty. Voltage and Hertz ratings printed on solenoid coils.

Power Consumption: 8 VA inrush, 6 VA holding on 50 or 60 Hz; 6 watts on DC.

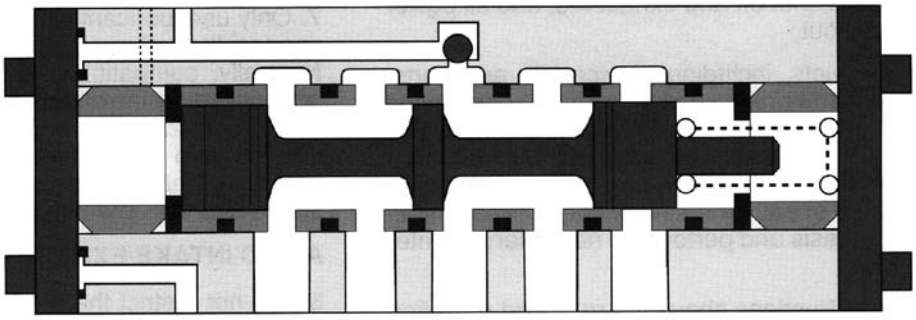
Temperature Ranges:
Ambient: 4° to 50°C (40° to 120°F).
Media: 4° to 80°C (40° to 175°F).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: Vacuum to 10 bar (150 psig).

Pilot Pressure:

Size 1: At least 2 bar (30 psig).
Sizes 2 and 3: At least 1 bar (15 psig).



Typical cross section of a ROSS Series W60 spool and sleeve valve body. Spring return model shown.

VALVE SERVICE

Listed below are the parts and service kits most likely to be needed if your valve requires service.

Valve Body Service Kits: These kits contain all parts needed for a complete reconditioning of a valve body. Included are a spool and sleeve assembly, all required gaskets and seals, detent assemblies for valves requiring them, and instructions for use.

Solenoid Coils: Replacement coils for solenoid controlled valves can be ordered by part number **306K33.** Specify the correct voltage and hertz when ordering.

Complete Solenoid Pilot Assemblies: These consist of new pilot valve mechanisms and a new coil, ready to bolt in position on the valve. Order by part number **851C79**, and specify the correct voltage and hertz.

Valve-to-Base Gasket: If your valve is removed from its base for any reason, a new valve-to-base gasket must be used to ensure a leak-free seal. (This gasket is included as a part of all valve body service kits.)

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

Valve Model Number	Valve Body Service Kit	Valve-to-Base Gasket
W6056B2411	1020K77	617B11
W6056B2417	831K77	617B11
W6056B3411	832K77	618B11
W6056B3417	916K77	618B11
W6056B4411	833K77	619B11
W6056B4417	917K77	619B11
W6057B2411	837K77	617B11
W6057B2417	838K77	617B11
W6057B3411	839K77	618B11
W6057B3417	840K77	618B11
W6057B4411	841K77	619B11
W6057B4417	842K77	619B11
W6076B2401	1020K77	617B11
W6076B2407	831K77	617B11
W6076B3401	832K77	618B11
W6076B3407	916K77	618B11
W6076B4401	833K77	619B11
W6076B4407	917K77	619B11
W6077B2401	837K77	617B11
W6077B2407	838K77	617B11
W6077B3401	839K77	618B11
W6077B3407	840K77	618B11
W6077B4401	841K77	619B11
W6077B4407	842K77	619B11

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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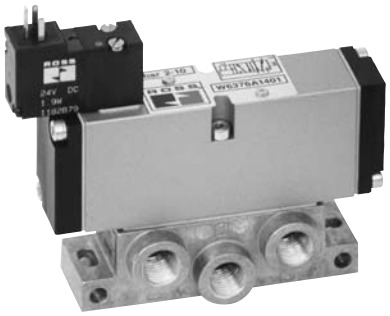
Series W63 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a resilient seal spool valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.



ROSS Series W63 valves are shown on bases.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. *It is recommended that an air filter be installed in the inlet line close to the valve.*

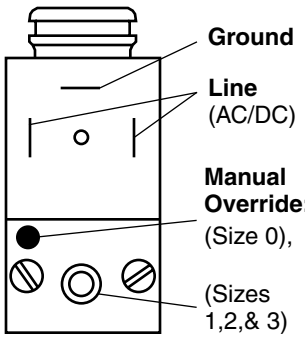
Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports 2 & 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports 3 & 5): The exhaust ports of a spool valve may be restricted in order to control cylinder speed. Also, to reduce noise you may use an efficient silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 decibels (dB), and produce little back pressure.

Electrical Supply:

The voltage and hertz ratings of the valve solenoids (if any) are printed on the solenoids. The electrical supply must correspond to these ratings, or the life of the solenoids will be shortened. Connections are made with a plug-in connector to the prongs as shown in the sketch of the pilot at the right. If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on inrush current.



Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:

Pressure Control: For valves with single remote pressure control, connect the control line to port 14 in the sub-base or manifold. For valves with double remote pressure control, connect the control lines to ports 12 and 14 in the base. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for the pilot valves is supplied from the inlet port. Be sure that port 14 in the base is plugged or pilot air will escape. If the valve must operate with an inlet pressure less than the required pilot pressure (see *Valve Specifications* on page 2), an external pilot supply of sufficient pressure must be provided. Connect the external pilot supply to port 14 in the base. The external pilot supply option is not available for the size 0 valves. It is not necessary to plug port 14 in the size 0 bases.

Non-Air Service: Such applications require an external pilot supply for solenoid valves. Connect to port 14 in the base. *Consult ROSS Technical Services for fluid media other than air.*

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

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ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate: A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate.

Compatible Lubricants: Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve: If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To clean the valve use any good commercial solvent. Do not scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as MobilGrease 28 for valve sizes 1, 2, & 3 or NYE 842S for size 0 valves.

Electrical Contacts: In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Component: After long usage dynamic seals may show signs of wear. The valve can be reconditioned with the use of ROSS service kits. See page 3 for information about such kits.

VALVE SPECIFICATIONS

Pressure Controlled

Temperature Ranges:
Sizes 1, 2, & 3: 40° to 175°F (4° to 80°C); extended to 220°F (105°C) for high-temperature models.
Size 0: 23° to 212° F (-5° to 100° C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 30 to150 psig (2 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoids: Rated for continuous duty. Voltage and hertz ratings printed on solenoid coils.

Power Consumption:
Sizes 1, 2, & 3: 8 VA inrush, 6 VA holding on 50 or 60 Hz; 6 watts on DC.
Size 0: 1.9 watts on DC.

Temperature Ranges:
Sizes 1, 2, & 3: *Ambient:* 40° to 120°F (4° to 50°C); extended to 175°F (80°C) for high-temperature models. *Media:* 40° to 175°F (4° to 80°C); extended to 220°F (105°C) for high-temperature models.
Size 0: *Ambient/Media:* 23° to 120°F (-5° to 50°C).

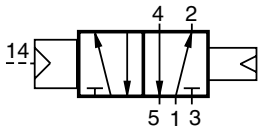
Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 30 to150 psig (2 to 10 bar).

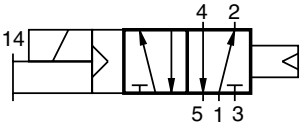
Pilot Pressure: Must be equal to or greater than inlet pressure.

VALVE OPERATION

5/2 SINGLE CONTROL VALVES



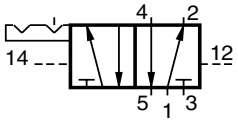
Pressure Controlled



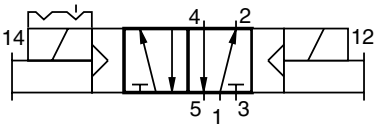
Solenoid Pilot

No Signal Applied: Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.
Signal 14 Applied: Inlet 1 connected to outlet 4; outlet 2 connected to exhaust 3; exhaust 5 closed.

5/2 MOMENTARY CONTROL VALVES



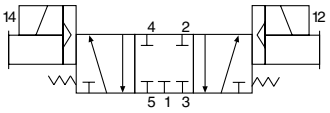
Pressure Controlled



Solenoid Pilot

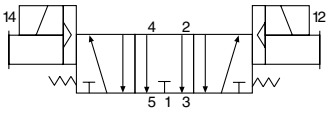
Signal 12 Applied Momentarily: Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.
Signal 14 Applied Momentarily: Inlet 1 connected to outlet 4; Outlet 2 connected to exhaust 3; exhaust 5 closed.

5/3 DOUBLE SOLENOID VALVES – CLOSED CENTER



Closed Center - No Signal Applied: Ports 1, 2, 3, 4, & 5 closed.
Open Center - No Signal Applied: Inlet 1 closed; Outlet 2 connected to exhaust 3 and outlet 4 connected to exhaust 5.

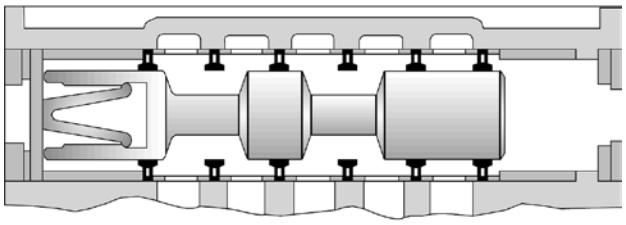
5/3 DOUBLE SOLENOID VALVES – OPEN CENTER



Signal 12 Applied (Open or Closed): Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.
Signal 14 Applied (Open or Closed): Inlet 1 connected to outlet 4; Outlet 2 connected to exhaust 3; exhaust 5 closed.

VALVE SERVICE

Valve Body Service Kits: These kits, listed at the right, contain all parts needed for a complete reconditioning of a valve body. Included are a spool, spacers, detent assemblies, for valves using them, and all required gaskets and seals along with instructions for use.



Typical Resilient Seal Spool Valve Cross Section

Solenoid Coils: Replacement coils for solenoid controlled valves can be ordered by part number **306K33.**
Specify the correct voltage and hertz when ordering. Coils not available separately for size 0 valves – order complete solenoid pilot assembly below.

Complete Solenoid Pilot Assemblies: These consist of new pilot valve mechanisms plus a new coil.

Order by part number **851C79**.

For size 0, valves order part number **1242B79**.
Specify the correct voltage and hertz.

Valve-to-Base Gasket: If your valve is removed from its base for any reason, a new valve-to base gasket must be used to ensure a leak-free seal (This gasket is already included in valve body service kits).

If you need additional information or have questions about installation or servicing your valve, call ROSS Technical Services at:
1-888-TEK-ROSS (835-7677) or (706)356-3708

Valve Model Numbers	Valve Body Service Kit	Pilot	Valve-to Base Gasket
W6356A1411	1584K77	NA	874B11
W6356A1417	1585K77	NA	874B11
W6356B1417	1585K77	NA	874B11
W6356B2411	1641K77	NA	617B11
W6356B2417	1644K77	NA	617B11
W6356B3411	1642K77	NA	618B11
W6356B3417	1645K77	NA	618B11
W6356B4411	1643K77	NA	619B11
W6356B4417	1646K77	NA	619B11
W6357B3411	1281K77	NA	618B11
W6357C3411	2125K77	NA	618B11
W6357B3417	1492K77	NA	618B11
W6357C3417	2126K77	NA	618B11
W6357B4411	1478K77	NA	619B11
W6357B4417	1490K77	NA	619B11
W6376A1401	1584K77	1242B79	874B11
W6376B1401	1584K77	1242B79	874B11
W6376A1407	1585K77	1242B79	874B11
W6376B1407	1585K77	1242B79	874B11
W6376B2401	1641K77	306K33	617B11
W6376B2403	1641K77	306K33	617B11
W6376B2411	1641K77	306K33	617B11
W6376B2407	1644K77	306K33	617B11
W6376B3401	1642K77	306K33	618B11
W6376B3407	1645K77	306K33	618B11
W6376B4401	1643K77	306K33	619B11
W6376B4411	1643K77	306K33	619B11
W6376B4407	1646K77	306K33	619B11
W6377A1401	1647K77	1242B79	874B11
W6377B1401	1647K77	1242B79	874B11
W6377A1407	1649K77	1242B79	874B11
W6377B1407	1649K77	1242B79	874B11
W6377B2401	1648K77	306K33	617B11
W6377B2407	1650K77	306K33	617B11
W6377B3401	1281K77	306K33	618B11
W6377C3401	2125K77	306K33	618B11
W6377B3407	1492K77	306K33	618B11
W6377C3407	2126K77	306K33	618B11
W6377B4401	1478K77	306K33	619B11
W6377B4407	1490K77	306K33	619B11

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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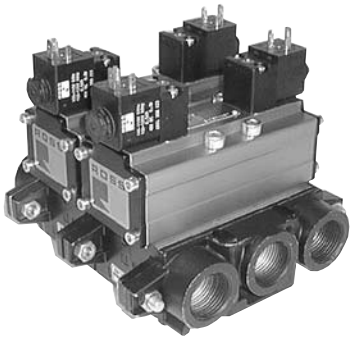
Series W64 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a single-spindle poppet valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.

ROSS Series W64 valves are shown on bases and with electrical connectors (purchased separately).



VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

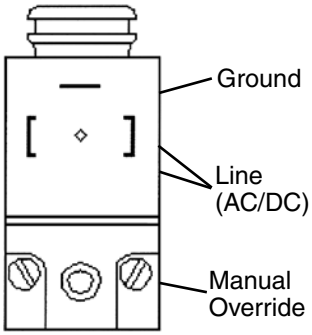
Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. *It is recommended that an air filter be installed in the inlet line close to the valve.*

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports 2 & 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports 3 & 5): Do not restrict exhaust air flow as this can adversely affect valve performance. However, to reduce noise you may use an efficient silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are printed on the solenoids. The electrical supply must correspond to these ratings, or the life of the solenoids will be shortened. Connections are made with a plug-in connector to the prongs as shown in the sketch of the pilot below. If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on inrush current.



Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:

Pressure Control: For valves with single remote pressure control, connect the control line to port 14 in the sub-base or manifold. For valves with double remote pressure control, connect the control lines to ports 12 and 14 in the base. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for the pilot valves is supplied from the inlet port. Be sure that port 14 in the base is plugged or pilot air will escape. If the valve must operate with an inlet pressure less than the required pilot pressure (see *Valve Specifications* on page 2), an external pilot supply of sufficient pressure must be provided. Connect the external pilot supply to port 14 in the base.

Non-Air Service: Such applications require an external pilot supply for solenoid valves. Connect to port 14 in the base. *Consult ROSS Technical Services for fluid media other than air.*

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

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ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate.

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.

To clean the valve use any good commercial solvent. Do not scrape varnished surfaces. Also do not use chlorinated solvents or abrasive materials. The former damages seals, and abrasives can do permanent damage to metal parts. Before reassembling the valve, lubricate all sliding surfaces with a grease such as Dow Corning BR-2.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. After long usage dynamic seals may show signs of wear. The valve can be reconditioned with the use of ROSS service kits.
See page 3 for information about such kits.

VALVE SPECIFICATIONS

Pressure Controlled

Temperature Range: 40° to 175°F (4° to 80°C); extended to 220°F (105°C) for high-temperature models.

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 30 to150 psig (2 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoids: Rated for continuous duty. Voltage and hertz ratings printed on solenoid coils.

Power Consumption: 8 VA inrush, 6 VA holding on 50 or 60 Hz; 6 watts on DC.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C); extended to 175°F (80°C) for high-temperature models.
Media: 40° to 175°F (4° to 80°C); extended to 220°F (105°C) for high-temperature models.

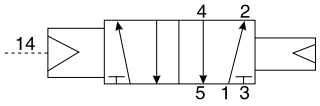
Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 30 to150 psig (2 to 10 bar).

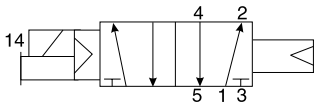
Pilot Pressure: Must be equal to or greater than inlet pressure.

VALVE OPERATION

5/2 SINGLE CONTROL VALVES



Pressure Controlled

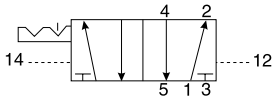


Solenoid Pilot

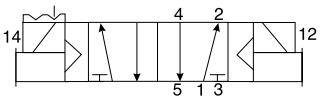
No Signal Applied: Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.

Signal 14 Applied: Inlet 1 connected to outlet 4; outlet 2 connected to exhaust 3; exhaust 5 closed.

5/2 MOMENTARY CONTROL VALVES



Pressure Controlled



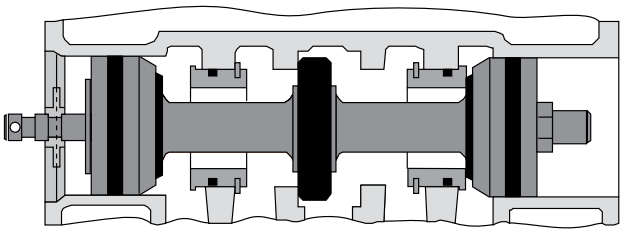
Solenoid Pilot

Signal 12 Applied Momentarily: Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.

Signal 14 Applied Momentarily: Inlet 1 connected to outlet 4; Outlet 2 connected to exhaust 3; exhaust 5 closed.

VALVE SERVICE

Valve Body Service Kits. These kits, listed at the right, contain all parts needed for a complete reconditioning of a valve body. Included are a spindle, all poppets and spacers, all required gaskets and seals, detent assemblies for valves using them, and instructions for use.



Typical Poppet Valve Cross Section

Solenoid Coils: Replacement coils for solenoid controlled valves can be ordered by part number **306K33.** Specify the correct voltage and hertz when ordering.

Complete Solenoid Pilot Assemblies. These consist of new pilot valve mechanisms plus a new coil. Order by part number **851C79**, and specify the correct voltage and hertz

Valve-to-Base Gasket. If your valve is removed from its base for any reason, a new valve-to base gasket must be used to ensure a leak-free seal. (This gasket is already included in valve body service kits.)

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

Valve Model Number	Valve Body Service Kit	Valve-to-Base Gasket
W6456B2411	1017K77	617B11
W6456B2412	1014K77	617B11
W6456B2417	834K77	617B11
W6456B2418	843K77	617B11
W6456B3411	1018K77	618B11
W6456B3412	1015K77	618B11
W6456B3417	835K77	618B11
W6456B3418	844K77	618B11
W6456B4411	1019K77	619B11
W6456B4412	1016K77	619B11
W6456B4417	836K77	619B11
W6456B4418	845K77	619B11
W6476B2401	1017K77	617B11
W6476B2402	1014K77	617B11
W6476B2407	834K77	617B11
W6476B2408	843K77	617B11
W6476B3401	1018K77	618B11
W6476B3402	1015K77	618B11
W6476B3407	835K77	618B11
W6476B3408	844K77	618B11
W6476B4401	1019K77	619B11
W6476B4402	1016K77	619B11
W6476B4407	836K77	619B11
W6476B4408	845K77	619B11

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Form SS098

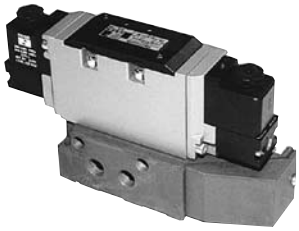
Series W65 Valves

Thank You!

You have purchased a premium quality ROSS® pneumatic valve. It is a precision spool-and- sleeve valve designed for mounting on a base with an ISO 5599/II interface.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information on this sheet. Then save it for future reference and for the useful service information it contains. A general service manual with more detailed information is available from ROSS upon request.

Pressure Controlled Valve



Double Solenoid Pilot Valve

Single Solenoid Pilot Valve

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. *It is recommended that a 5-micron-rated air filter be installed in the inlet line close to the valve.*

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, a sharp bend, or a clogged filter element. An inadequate air supply will adversely affect the performance of your valve.

Valve Outlets (Ports 2 and 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports 3 and 5): To reduce exhaust noise, an efficient silencer may be used. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the valve. The electrical supply must correspond to these ratings. Otherwise the solenoids are subject to early failure. If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on the reverse side of this sheet for information on inrush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperature are given in the *Valve Specifications* on the reverse side of this sheet. Exceeding the values shown can shorten valve life.

Pilot Supply:

Pressure Control: For valves with single remote pressure control, connect the control line to port 14 in the sub-base or manifold. For valves with double remote pressure control, connect the control lines to ports 12 and 14 in the base. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for pilot valves is supplied from the inlet port. Be sure that port 14 in the base is plugged or pilot air will escape. If the valve must operate with an inlet pressure less than the required pilot pressure (see *Valve Specifications* on page 2), an external pilot supply of sufficient pressure must be provided. Connect the external pilot supply to port 14 in the base.

Non-Air Service: Such applications require an external pilot supply for solenoid valves. Connect to port 14 in the base. *Consult ROSS for fluid media other than air.*

Pipe Installation: To install pipe in valve ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

ROSS CONTROLS®	United States	TEL: Tech. Svs. 888-TEK-ROSS / Cust. Svs. 800-GET-ROSS	web site: www.rosscontrols.com
ROSS EUROPA® GmbH	Germany	TEL: 49-6103-7597-0	web site: www.rosseuropa.com
ROSS ASIA® K.K.	Japan	TEL: 81-427-78-7251	web site: www.rossasia.co.jp
ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
ROSS CONTROLS® INDIA Pvt. Ltd.	India	TEL: 91-44-2624-9040	email: rossindia@airtelbroadband.in
ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate.

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.
A schedule should be established for cleaning all valves, the frequency depending on the cleanliness of the air being supplied.
To clean the valve use a solvent which will dry without leaving a residue. This is especially important for the spool-and-sleeve assembly. Do not use a chlorinated solvent or abrasive materials which can damage seals or do permanent damage to metal parts.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To reassemble the spool and sleeve put one drop of Anderol 735 (or equivalent lubricant) on each spool land. Insert the spool into the sleeve and rotate it several times to ensure even distribution of the lubricant. If the valve is used in a non-lubricated application, do not use a lubricant for reassembly which can dry out and leave a residue. Dry assembly of the spool and sleeve is preferable. Each spool and sleeve is a matched set, so care must be taken not to reverse the position of the spool in the sleeve.

Before inserting the spool-and-sleeve into the valve body, very lightly lubricate the O-rings with a lubricant such as MobilGrease 28. Do not use Anderol; it causes the O-rings to deteriorate.

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. After long usage the spool and sleeve may show signs of wear. The valve can be completely reconditioned with the use of ROSS service kits. See page 3 for information about such kits.

VALVE SPECIFICATIONS

Pressure Controlled

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: Vacuum to 150 psig (10 bar) – 16 bar optional; consult ROSS.

Pilot Pressure: At least 30 psig (2 bar).

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoids: Rated for continuous duty. Voltage and hertz ratings shown on valve.

Power Consumption: Each solenoid: 6.5 VA holding on 50 or 60 Hz; 3.5 watts on DC.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

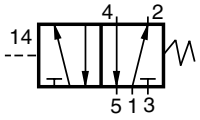
Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: Vacuum to 150 psig (10 bar).
235 psig (16 bar) also available; consult ROSS.

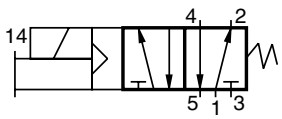
Pilot Pressure: At least 30 psig (2 bar).

VALVE OPERATION

5/2 SINGLE CONTROL VALVES



Pressure Controlled

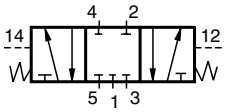


Solenoid Pilot

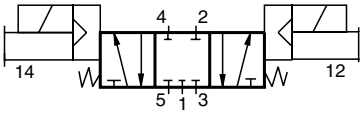
No Signal Applied: Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.

Signal 14 Applied: Inlet 1 connected to outlet 4; outlet 2 connected to exhaust 3; exhaust 5 closed.

5/3 CLOSED CENTER VALVES



Pressure Controlled



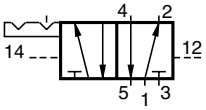
Solenoid Pilot

No Signal Applied: All ports closed.

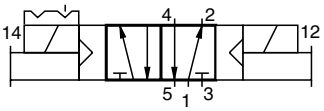
Signal 12 Applied: Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.

Signal 14 Applied: Inlet 1 connected to outlet 4; outlet 2 connected to exhaust 3; exhaust 5 closed.

5/2 MOMENTARY CONTROL VALVES



Pressure Controlled

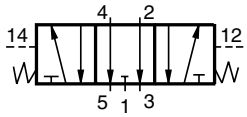


Solenoid Pilot

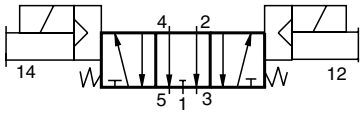
Signal 12 Applied Momentarily: Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.

Signal 14 Applied Momentarily: Inlet 1 connected to outlet 4; Outlet 2 connected to exhaust 3; exhaust 5 closed.

5/3 OPEN CENTER VALVES



Pressure Controlled



Solenoid Pilot

No Signal Applied: Inlet 1 closed; outlet 2 connected to exhaust 3; outlet 4 connected to exhaust 5.

Signal 12 Applied: Inlet 1 connected to outlet 2; outlet 4 connected to exhaust 5; exhaust 3 closed.

Signal 14 Applied: Inlet 1 connected to outlet 4; outlet 2 connected to exhaust 3; exhaust 5 closed.

VALVE SERVICE

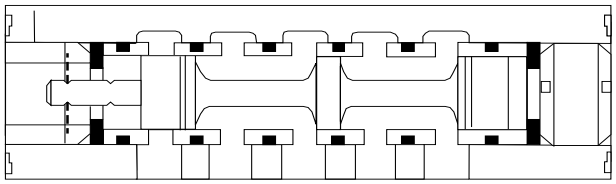
ROSS would be happy to service this valve for you at its factory repair center (1-800-GET-ROSS). However, if you choose to service this valve yourself, it is strongly recommended that you obtain a free service manual from ROSS in the U.S.A. at **1-800-GET-ROSS**.

Listed below are the valve body service kits and solenoid replacement coils for Series W65 valves.

Valve Body Service Kits. These kits contain all parts needed for complete reconditioning of a valve body. Included are a spool and sleeve, all required gaskets and seals, and instructions for use.

If you need additional information or have questions about installation or servicing your valve, call ROSS Technical Services at:
1-888-TEK-ROSS (835-7677) or (706)356-3708

	Valve Body Service Kit Numbers			Solenoid
Valve Type	Size 1	Size 2	Size 3	Coil
Single Control	1422K77	1467K77	1471K77	334B33
Momentary Control	1423K77	1468K77	1472K77	334B33
Closed Center	1424K77	1469K77	1473K77	334B33
Open Center	1425K77	1470K77	1474K77	334B33

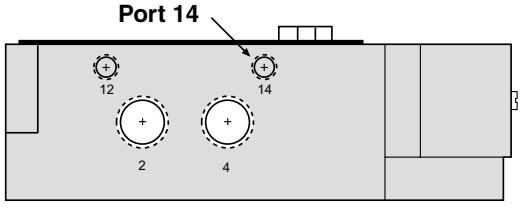


Typical Spool-and-Sleeve Cross Section

CONVERSION TO EXTERNAL PILOT SUPPLY

To convert a W65 Series ISO valve to external pilot supply:

1. Remove pipe plug from port 14 on base or manifold.
2. Pipe a 1/8" supply line to port 14.
3. Pressure in external supply line should be greater than inlet. If, for any reason, the external supply is lost or drops below inlet pressure (port 1), the valve will switch back to internal pilot supply.



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6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

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9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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Series W70 Valves

Thank You!

You have purchased a premium-quality ROSS® pneumatic valve. It is a stainless-steel spool-and-sleeve valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.

ROSS Series W70 valves and bases sold separately.

VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Ports: Your valve is a multipurpose valve and may have any of its ports restricted and/or pressurized provided there is sufficient pilot pressure. Conventional port usage is identified below.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports 2 & 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports 3 & 5): These ports may be restricted to control cylinder speed. To reduce exhaust noise use an efficient silencer. ROSS MUFFL-AIR® silencers reduce impact noise by as much as 25 dB, and produce little back pressure.

Electrical Supply: The voltage and hertz ratings for solenoid pilot-operated valves can be found on the side of each pilot housing. Ensure that the electrical supply used is equal to these ratings to avoid solenoid burnout. The electrical connection for these valves is achieved at the base to valve interface by means of mating connectors.

If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on in-rush current.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

Pilot Supply:

Pressure Control: For valves with single remote pressure control, connect the control line to port 14 in the sub-base or manifold. For valves with double remote pressure control, connect the control lines to both ports 12 and 14 in the base. See *Valve Specifications* on page 2 for required pressures.

Solenoid Control: Pressure for the pilot valves is supplied from the inlet port. Be sure that the external pilot supply port in the base is plugged or pilot air will escape. If the valve must operate with an inlet pressure less than the required pilot pressure (see *Valve Specifications* on page 2), an external pilot supply must be provided. Connect to the appropriate port in the base.

Vacuum or Non-Air Service: Such applications require an external pilot supply for solenoid valves. Connect to the appropriate port in the base.

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

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DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Pneumatic equipment should be maintained only by persons trained and experienced in the maintenance of such equipment.

Supply Clean Air. Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located close to the valve is strongly recommended. The filter bowl should be drained regularly, and if its location makes draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate. A lubricator should put a fine oil mist into the air line in direct proportion to the rate of air flow. Excessive lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute is adequate.

Compatible Lubricants. Although this valve does not require air line lubrication, it may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and so cause the valve to malfunction. Avoid oils with phosphate additives (e.g., zinc dithiophosphate), and diester oils; both types can harm valve components. The best oils to use are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning the Valve. If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance.

To clean the valve use a solvent which will dry without leaving a residue. This is especially important for the spool-and-sleeve assembly. Do not use a chlorinated solvent or abrasive materials. The former damages seals and abrasives can do permanent harm to metal parts.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

To reassemble the spool and sleeve put one drop of Anderol 735 (or equivalent lubricant) on each spool land. Insert the spool into the sleeve and rotate it several times to ensure even distribution of the lubricant. If the valve is used in a non-lubricated application, do not use a lubricant for reassembly which can dry out and leave a residue. Dry assembly of the spool and sleeve is preferable. Each spool and sleeve is a matched set, so care must be taken not to reverse the position of the spool in the sleeve.

Before inserting the spool-and-sleeve into the valve body, very lightly lubricate the O-rings with a compatible lubricant. *Do not use Anderol; it causes the O-rings to deteriorate.*

Electrical Contacts. In the electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components. In some cases it is not necessary to remove the valve from its installation for servicing. However, turn off the electrical power to the valve, shut off the air supply, and exhaust the air in the system before beginning any disassembly operation. Service kits for these valves are listed on page 3.

VALVE SPECIFICATIONS

Valve Sizes: The basic size of your valve is indicated by the "size digit" which is the fourth digit from the end of the valve's model number. For example, the size digit is 8 in the model number W7076C8331. For the five different sizes of valves the size digit may be 2, 3, 4, 6, or 8. These are arbitrary numbers, and are *not* related to C_v ratings.

Pressure Controlled

Temperature Range: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recomended.

Inlet Pressure: Vacuum to 150 psig (10 bar).

Pilot Pressure:
Models with size digit 2 or 8: At least 2 bar (30 psig).
Models with size digit 3, 4, or 6: At least 1 bar (15 psig).

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoids: Rated for continuous duty.

Power Consumption:
Pilot solenoids for models with size digit 2: 10 VA inrush, 9 VA holding on 50 or 60 Hz; 5 watts on DC.
Pilot solenoids for all other models: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.
Direct solenoids for models with size digit 2: 140 VA inrush, 30 VA holding on 50 or 60 Hz; 20 watts on DC.
Direct solenoids for all other models: 380 VA inrush, 58 VA holding on 50 or 60 Hz.

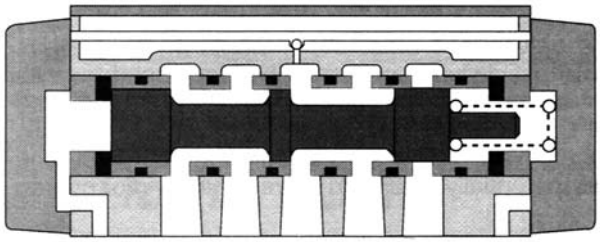
Temperature Range:
Ambient: 40° to 120°F (4° to 50°C).
Media: 40° to 175°F (4° to 80°C).

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: Vacuum to 150 psig (10 bar).

Pilot Pressure:
Models with size digit 2 or 8: At least 30 psig (2 bar).
All other models: At least 15 psig (1 bar).

VALVE SERVICE



Typical cross section of a ROSS Series W70 spool-&-sleeve valve body. Spring return model shown.

Listed below and in the chart at the right are the service kits and other parts required to repair or refurbish Series W70 valves.

Valve Body Service Kits. These kits contain all parts needed for a complete reconditioning of a valve body. Included are a spool-and-sleeve assembly, all required gaskets and seals, detent assemblies for valves requiring them, and instructions for use.

Solenoid Pilot Kits: These kits contain all parts needed to recondition the pilot valve. Order by the following kit numbers:

Pilots using solenoid 304B33: Kit **714K77**

Pilots using solenoid 347B04 or 411B04: Kit **946K87**

Solenoids: Replacement solenoids can be ordered by the part numbers given in the chart at the right**.** Specify the correct voltage and hertz when ordering.

Valve-to-Base Gasket. If your valve is removed from its base for any reason, a new valve-to base gasket must be used to ensure a leak-free seal. (This gasket is already included as a part of valve body service kits.)

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

Valve Model Number*	Valve Body Service Kit	Gasket & Seal Kit	Valve-Base Gasket	Solenoid Number
W7016A2331	708K77	—	553B11	171C95
W7016A2332	709K77	—	553B11	171C95
W7016A3331	276K87	305A87	549B11	349B04
W7016A3332	277K87	305A87	549B11	349B04
W7016C4331	W742K87	W769A87	958B11	349B04
W7016C4332	W743K87	W769A87	958B11	349B04
W7017A2331	1059K77	—	553B11	171C95
W7017A2332	275K87	—	553B11	171C95
W7017A3331	279K87	305A87	549B11	349B04
W7017A3332	282K87	305A87	549B11	349B04
W7017C4331	W744K87	W769A87	958B11	349B04
W7017C4332	W745K87	W769A87	958B11	349B04
W7056A2331	708K77	—	553B11	—
W7056A2332	—	—	553B11	—
W7056A3331	276K87	305A87	549B11	—
W7056A3332	277K77	305A87	549B11	—
W7056B4331	W742K87	W769A87	356B11	—
W7056B4332	W743K87	W769A87	356B11	—
W7056A6331	W746K87	W770A87	344B11	—
W7056A6332	W747K87	W770A87	344B11	—
W7056A8331	W750K87	W771A87	339C11	—
W7056A8332	W751K87	W771A87	339C11	—
W7057A2331	—	—	553B11	—
W7057A2332	275K87	—	553B11	—
W7057A3331	279K87	305A87	549B11	—
W7057A3332	282K87	305A87	549B11	—
W7057B4331	W787K87	W769A87	958B11	—
W7057B4332	W788K87	W769A87	958B11	—
W7057A6331	W748K87	W770A87	344B11	—
W7057A6332	W749K87	W770A87	344B11	—
W7057A8331	W752K87	W771A87	339C11	—
W7057A8332	W753K87	W771A87	339C11	—
W7076A2331	708K77	—	553B11	304B33
W7076A2332	709K77	—	553B11	304B33
W7076A3331	276K87	305A87	549B11	347B04
W7076A3332	277K87	305A87	549B11	347B04
W7076D4331	W742K87	W769A87	958B11	411B04
W7076D4332	W743K87	W769A87	958B11	411B04
W7076C6331	W746K87	W770A87	344B11	411B04
W7076C6332	W747K87	W770A87	344B11	411B04
W7076C8331	W750K87	W771A87	339C11	411B04
W7076C8332	W751K87	W771A87	339C11	411B04
W7077A2331	—	—	553B11	304B33
W7077A2332	275K87	—	553B11	304B33
W7077A3331	279K87	305A87	549B11	347B04
W7077A3332	282K87	305A87	549B11	347B04
W7077D4331	W744K87	W769A87	958B11	411B04
W7077D4332	W745K87	W769A87	958B11	411B04
W7077C6331	W748K87	W770A87	344B11	411B04
W7077C6332	W749K87	W770A87	344B11	411B04
W7077C8331	W752K87	W771A87	339C11	411B04
W7077C8332	W753K87	W771A87	339C11	411B04

*Solenoid pilot models shown above have internal pilot supply, and their model numbers all end in the digits "1" or "2." Corresponding model numbers for external pilot supply end in the digits "3" or "4," and use the same kits as the internal supply models.

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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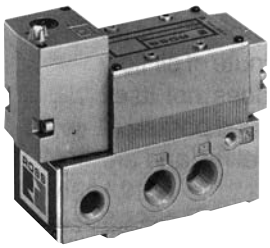
Series W74 Valves

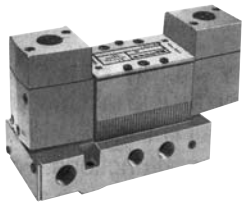
Thank You!

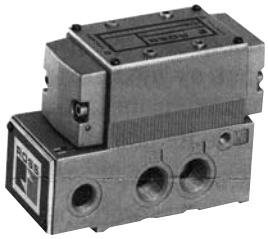
You have purchased a premium-quality ROSS® pneumatic valve. It is a single-spindle poppet valve built to the highest standards.

With care in its installation and maintenance you can expect it to have a long and economical service life. So before you go any further, please take a few minutes to look over the information in this folder. Then save it for future reference and for the useful service information it contains.

ROSS Series W74 valves and bases sold separately.







VALVE INSTALLATION

Pneumatic equipment should be installed only by persons trained and experienced in such installation.

Operating Pressures and Temperatures: Allowable ranges for pressure and temperatures are given in the *Valve Specifications* on page 2. Exceeding the values shown can shorten valve life.

If the model number on your valve ends with 336, 337, 338, or 339 your valve is designed for high temperature service.

If the model number on your valve ends with 331, 332, 333, or 334 your valve is designed for standard temperatures.

If the model number ends with any other group of digits you have ordered a valve with special characteristics. Consult ROSS to verify the characteristics of your particular valve.

Air Lines: Before installing a valve in a new or an existing system, the air lines must be blown clean of all contaminants. It is recommended that an air filter be installed in the inlet line close to the valve.

Valve Inlet (Port 1): Be sure that the supply line is of adequate size and does not restrict the air supply because of a crimp in the line, sharp bends, or a clogged filter element.

Valve Outlets (Ports 2 & 4): For faster pressurizing and exhausting of the mechanism being operated by the valve, locate the valve as close as possible to the mechanism. The lines must be of adequate size and be free of crimps and sharp bends.

Valve Exhausts (Ports 3 & 5): Exhaust air flow must not be restricted for proper valve performance. However, any properly sized silencer, such as a ROSS MUFFL-AIR® silencer, should be used to reduce impact noise without providing excessive back pressure.

Electrical Supply: The voltage and hertz ratings of the valve solenoids (if any) are shown on the pilot housings. Electrical supply must correspond to these ratings. Otherwise life of the solenoids will be shortened.

Electrical power from the valve's base goes to the solenoid(s) via the plug-in connector at the valve-base interface. If power is supplied by a transformer it must be capable of handling the inrush current without significant voltage drop. See *Valve Specifications* on page 2 for information on in-rush current.

Pilot Supply:

Pressure Control: For valves with single remote pressure control, connect the control line to port 14 in the sub-base or manifold. For valves with double remote pressure control, connect the control lines to ports 12 and 14 in the base. See *Valve Specifications* on page 2 for required pressures.

Solenoid Pilot: Pressure for the pilot valves is supplied from the inlet port. Be sure that the external pilot supply port in the base is plugged or pilot air will escape. If the valve must operate with an inlet pressure less than the required pilot pressure (see *Valve Specifications* on page 2), an external pilot supply must be provided. Connect to the appropriate port in the base.

Non-Air Service: Such applications require an external pilot supply for solenoid valves. Connect to the appropriate port in the base.

Pipe Installation: To install pipe in valve or base ports, engage pipe one turn, apply pipe thread sealant (tape not recommended), and tighten pipe. This procedure will prevent sealant from entering and contaminating the valve.

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ROSS UK Ltd.	United Kingdom	TEL: 44-121-559-4900	email: sales@rossuk.co.uk
ROSS SOUTH AMERICA Ltda.	Brazil	TEL: 55-11-4335-2200	email: vendas@ross-sulamerica.com.br
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ROSS CONTROLS (CHINA) Ltd.	China	TEL: 86-21-6915-7951	email: alvinzhurong@vip.163.com
DIMAFLUID s.a.s.	France	TEL: 33-01-49-45-65-65	web site: www.dimafluid.com

VALVE MAINTENANCE

Supply Clean Air: Foreign material lodging in valves is a major cause of breakdowns. The use of a 5-micron-rated air filter located as close to the valve as possible is strongly recommended. The filter bowl should be drained regularly. If the filter's location makes manual draining difficult, the filter should be equipped with an automatic drain.

Check Lubricator Supply Rate: A lubricator should put atomized oil into the air line in direct proportion to the rate of air flow. Excessive air line lubrication can cause puddling in the valve and lead to malfunctions. For most applications an oil flow rate in the lubricator of one drop per minute of air flow is adequate.

Compatible Lubricants: This valve may be used with lubricated air being supplied to other mechanisms. Some oils contain additives that can harm seals or other valve components and thereby cause the valve to malfunction. The best oils to use are those specifically compounded for air line lubricator service. These are generally petroleum base oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32 or lighter viscosity.

Some compatible oils are listed above at the right. These oils, although believed to be compatible, could change without notice because manufacturers sometimes reformulate their oils. Therefore, use oils specifically compounded for air line service. If it is a synthetic oil, contact the oil manufacturer for compatibility information.

Cleaning Valve: If the air supplied to the valve has not been well filtered, the interior of the valve may accumulate dirt and varnish which can affect the valve's performance. Although ROSS poppet valves are very tolerant of dirty air, cleaning may sometimes be necessary.

To clean the valve use any good commercial solvent or kerosene. Do *not* use a chlorinated solvent or abrasive materials which can damage seals or do permanent damage to metal parts. Before reassembling the valve lubricate all sliding surfaces with a grease equivalent to MobilGrease 28.

COMPATIBLE LUBRICANTS

Maker	Brand Name
Amoco	American Industrial Oil 32; Amoco Spindle Oil C; Amolite 32
Citgo	Pacemaker 32
Exxon	Spinesstic 22; Teresstic 32
Mobil	Velocite 10
Non-Fluid Oil	Air Lube 10H/NR
Shell	Turbo T32
Sun	Sunvis 11; Sunvis 722
Texaco	Regal R&O 32
Union	Union Turbine Oil

Electrical Contacts: In the external electrical circuits associated with the valve solenoids, keep all switches or relay contacts in good condition to avoid solenoid malfunctions.

Replace Worn Components: After long usage the poppets may show signs of wear. The valve can be reconditioned with the use of ROSS service kits. See page 3 for information about such kits.

VALVE SPECIFICATIONS

Valve Sizes: The basic size of your valve is indicated by the "size digit" which is the fourth digit from the end of the valve's model number.

For example, the size digit is 8 in the model number W7476A8331. For the five different sizes of valves the size digit may be 2, 3, 4, 6, or 8. These are arbitrary numbers and are not related to C_v ratings.

Pressure Controlled

Temperature Range: 40° to 175°F (4° to 80°C).

Media temperature extended to 220°F (105°C) for high- temperature models.

Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 30 to 150 psig (2 to 10 bar).

Pilot Pressure: Must be equal to or greater than inlet pressure.

IMPORTANT NOTE: Please read carefully and thoroughly all the CAUTIONS on page 4.

Solenoid Pilot

Solenoids: Rated for continuous duty. Voltage and hertz ratings printed on solenoid coils.

Power Consumption:
Solenoids for models with size digit 2: 10 VA inrush, 9 VA holding on 50 or 60 Hz; 5 watts on DC.
Solenoids for all other models: 87 VA inrush, 30 VA holding on 50 or 60 Hz; 14 watts on DC.

Temperature Range:
Ambient: 40° to 120°F (4° to 50°C); extended to 175°F (80°C) for high-temperature models.
Media: 40° to 175°F (4° to 80°C); extended to 220°F (105°C) for high-temperature models.

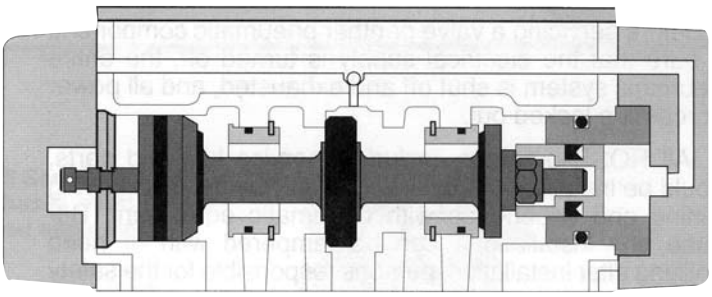
Flow Media: Filtered air; 5 micron recommended.

Inlet Pressure: 2 to 10 bar (30 to 150 psig).

Pilot Pressure: Must be equal to or greater than inlet pressure.

VALVE SERVICE

Typical cross section of a ROSS Series W74 poppet valve body. Internal pressure return model shown.



Listed below and in the chart at the right are the service kits and other parts required to repair or refurbish Series W74 valves.

Valve Body Service Kits. These kits contain all parts needed for a complete reconditioning of a valve body. Included are a spindle, all poppets and spacers, all required gaskets and seals, detent assemblies for valves requiring them, and instructions for use.

Solenoid Pilot Kits: These kits contain all parts needed to recondition the pilot valve. Order by the following kit numbers:

Pilots using solenoid 304B33: Kit **714K77**

Pilots using solenoid 347B04 or 411B04: Kit **946K87**

Solenoids: Replacement solenoids can be ordered by the part numbers given in the chart at the right**.** Specify the correct voltage and hertz when ordering.

Valve-to-Base Gasket. If your valve is removed from its base for any reason, a new valve-to base gasket must be used to ensure a leak-free seal. (This gasket is included as a part of all valve body service kits.)

If you have any questions about installing or servicing your valve, call ROSS *Technical Services* at your nearest ROSS location (see page 1) or in the U.S.A. at:

1-888-TEK-ROSS or 1-706-356-3708

Valve Model Number	Valve Body Service Kit	Gasket & Seal Kit	Valve-Base Gasket	Solenoid Number
W7456A2331	712K77	—	553B11	—
W7456A2332	712K77	—	553B11	—
W7456A2336	854K77	—	553B11	—
W7456A2337	856K77	—	553B11	—
W7456A3331	696K77	—	549B11	—
W7456A3332	699K77	—	549B11	—
W7456A3336	713K77	—	549B11	—
W7456A3337	1085K77	—	549B11	—
W7456C4331	615K77	819K77	958B11	—
W7456C4332	615K77	819K77	958B11	—
W7456C4336	1065K77	—	958B11	—
W7456C4337	616K77	—	958B11	—
W7456A6331	742K77	—	344B11	—
W7456A6332	743K77	—	344B11	—
W7456A6336	811K77	—	344B11	—
W7456A6337	812K77	—	344B11	—
W7456A8331	744K77	—	339C11	—
W7456A8332	745K77	—	339C11	—
W7456A8336	711K77	—	339C11	—
W7456A8337	711K77	—	339C11	—
W7476A2331	712K77	—	553B11	304B33
W7476A2332	712K77	—	553B11	304B33
W7476A2336	854K77	—	553B11	304B33
W7476A2337	856K77	—	553B11	304B33
W7476A3331	696K77	—	549B11	347B04
W7476A3332	699K77	—	549B11	347B04
W7476A3336	713K77	—	549B11	347B04
W7476A3337	1085K77	—	549B11	347B04
W7476C4331	615K77	819K77	958B11	411B04
W7476C4332	615K77	819K77	958B11	411B04
W7476C4333	615K77	819K77	958B11	411B04
W7476C4334	615K77	819K77	958B11	411B04
W7476C4336	1065K77	—	958B11	411B04
W7476C4337	616K77	—	958B11	411B04
W7476C4338	1065K77	—	958B11	411B04
W7476B4339	616K77	—	356B11	411B04
W7476A6331	742K77	—	344B11	411B04
W7476A6332	743K77	—	344B11	411B04
W7476A6336	811K77	—	344B11	411B04
W7476A6337	812K77	—	344B11	411B04
W7476A8331	744K77	—	339C11	411B04
W7476A8332	745K77	—	339C11	411B04
W7476A8336	711K77	—	339C11	411B04
W7476A8337	711K77	—	339C11	411B04

STANDARD CAUTIONS

PRE-INSTALLATION or SERVICE

1. Before servicing a valve or other pneumatic component, be sure that all sources of energy are turned off, the entire pneumatic system is shut off and exhausted, and all power sources are locked out (ref: OSHA 1910.147, EN 1037).

2. All ROSS products, including service kits and parts, should be installed and/or serviced only by persons having training and experience with pneumatic equipment. Because any installation can be tampered with or need servicing after installation, persons responsible for the safety of others or the care of equipment must check every installation on a regular basis and perform all necessary maintenance.

3. All applicable instructions should be read and complied with before using any fluid power system in order to prevent harm to persons or equipment. In addition, overhauled or serviced valves must be functionally tested prior to installation and use.

4. Each ROSS product should be used within its specification limits. In addition, use only ROSS parts to repair ROSS products. Failure to follow these directions can adversely affect the performance of the product or result in the potential for human injury.

FILTRATION and LUBRICATION

5. Dirt, scale, moisture, etc. are present in virtually every air system. Although some valves are more tolerant of these contaminants than others, best performance will be realized if a filter is installed to clean the air supply, thus preventing contaminants from interfering with the proper performance of the equipment. ROSS recommends a filter with a 5-micron rating for normal applications.

6. All standard ROSS filters and lubricators with polycarbonate plastic bowls are designed for compressed air applications only. Do *not* fail to use the metal bowl guard, where provided, to minimize danger from high pressure fragmentation in the event of bowl failure. Do not expose these products to certain fluids, such as alcohol or liquefied petroleum gas, as they can cause bowls to rupture, creating a combustible condition, hazardous leakage, and the potential for human injury. Immediately replace a crazed, cracked, or deteriorated bowl. When bowl gets dirty, replace it or wipe it with a clean dry cloth.

7. Only use lubricants which are compatible with materials used in the valves and other components in the system. Normally, compatible lubricants are petroleum based oils with oxidation inhibitors, an aniline point between 180°F (82°C) and 220°F (104°C), and an ISO 32, or lighter, viscosity. Avoid oils with phosphate type additives which can harm polyurethane components, potentially leading to valve failure and/or human injury.

AVOID INTAKE/EXHAUST RESTRICTION

8. Do not restrict the air flow in the supply line. To do so could reduce the pressure of the supply air below the minimum requirements for the valve and thereby cause erratic action.

9. Do not restrict a valve's exhaust port as this can adversely affect its operation. Exhaust silencers must be resistant to clogging and have flow capacities at least as great as the exhaust capacities of the valves. Contamination of the silencer can result in reduced flow and increased back pressure.

ROSS expressly disclaims all warranties and responsibility for any unsatisfactory performance or injuries caused by the use of the wrong type, wrong size, or inadequately maintained silencer installed with a ROSS product.

POWER PRESSES

10. Mechanical power presses and other potentially hazardous machinery using a pneumatically controlled clutch and brake mechanism must use a press control double valve with a monitoring device. A double valve without a self-contained monitoring device should be used only in conjunction with a control system which assures monitoring of the valve. All double valve installations involving hazardous applications should incorporate a monitoring system which inhibits further operation of the valve and machine in the event of a failure within the valve mechanism.

ENERGY ISOLATION/EMERGENCY STOP

11. Per specifications and regulations, ROSS **L-O-X®** and **L-O-X®** with **EEZ-ON®** operation products are defined as energy isolation devices, NOT AS EMERGENCY STOP DEVICES.

WARRANTY

Products manufactured by ROSS are warranted to be free of defects in material and workmanship for a period of one year from the date of purchase. ROSS' obligation under this warranty is limited to repair or replacement of the product or refund of the purchase price paid solely at the discretion of ROSS and provided such product is returned to ROSS freight prepaid and upon examination by ROSS is found to be defective. This warranty shall be void in the event that product has been subject to misuse, misapplication, improper maintenance, modification or tampering. THE WARRANTY EXPRESSED ABOVE IS IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES AND ROSS EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED WITH RESPECT TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ROSS MAKES NO WARRANTY WITH RESPECT TO ITS PRODUCTS MEETING THE PROVISIONS OF ANY GOVERNMENTAL OCCUPATIONAL SAFETY AND/OR HEALTH LAWS OR REGULATIONS. IN NO EVENT SHALL ROSS BE LIABLE TO PURCHASER, USER, THEIR EMPLOYEES OR OTHERS FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH MAY RESULT FROM A BREACH OF THE WARRANTY DESCRIBED ABOVE OR THE USE OR MISUSE OF THE PRODUCTS. NO STATEMENT OF ANY REPRESENTATIVE OR EMPLOYEE OF ROSS SHALL EXTEND THE LIABILITY OF ROSS AS SET FORTH HEREIN.

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